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The results of this exploratory study on cost-benefit analysis of vocational rehabilitation found that, because of vocational rehabilitation services, clients whose cases were closed during fiscal year 1966 will experience an increase of $35 in their earnings and value of work activity over their working lives for every dollar expended on them in rehabilitation services. The full group of clients for whom estimates were derived are shown as follows: (1) rehabilitated wage earners, 127,824, (2) rehabilitated homemakers and unpayed family workers, 24,127, (3) rehabilitated self-employed farmers, 2,328, and (4) closed cases not rehabilitated, 48,969. The main factors considered in deriving an estimate of the increase in lifetime earnings or rehabilitated clients attributable to vocational rehabilitation services were (1) the rates of deaths and new or recurrent disability among clients causing termination of employment through the years, (2) the number of years of work life for remaining clients until retirement, (3) the earnings associated with clients remaining in employment through the years, (4) the present value of future earnings, and (5) the change in amount of productivity of workers of the future. (CH)

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# COST-BENEFITS ANALYSIS

OF
VOCATIONAL
REHABILITATION

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Vocational Rehabilitation Administration
Division of Statistics and Studies.
Washington, D.C. 20201

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# AN EXPLORATORY COST-BENEFITS ANALYSIS OF VOCATIONAL REHABILITATION

Measurement of the increased lifetime amount of earnings and value of work activity due to vocational rehabilitation services among clients whose cases were closed during fiscal year 1966.

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Vocational Rehabilitation Administration

MARY E. SWITZER, Commissioner

Paul W. Pyle, Jr., Deputy Commissioner

James F. Garrett, Associate Commissioner, Research and Training
Joseph Hunt, Associate Commissioner, Program Services
Russell J. N. Dean, Assistant Commissioner, Legislation and Public Affairs
Paul C. Howard, Assistant Commissioner, Regional Operations
Samuel E. Martz, Assistant Commissioner for Administration

Prepared by:
Division of Statistics and Studies
Sigmund Schor, Chief
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## FOREWORD

In August 1965, the President announced the introduction of a new planning, programming, and budgeting system throughout the Federal Government. The purpose of this system was to improve the efficiency and effectiveness of Federal programs. One of the principal means by which these objectives were to be accomplished was the analysis of the costs and benefits of Government programs.

The Department of Health, Education, and Welfare has, over the past year, made substantial progress at evaluating its programs. In the spring of 1966 the Secretary of Health, Education, and Welfare formed a number of Program Analysis Groups for the purpose of analyzing the costs, effects, and benefits of HEW programs. One of these groups was charged with the responsibility for studying Human Investment Programs--those designed to raise future earning power by training, education, and rehabilitation.

The following report is the contribution of the Vocational Rehabilitation Administration. Within the limits of the available data this report explores thoroughly the impact of vocational rehabilitation on the future earnings of its clients. The analysis shows that in relation to costs vocational rehabilitation pays handsome dividends in terms of a better life for those served.

William Gorham
Assistant Secretary for
Program Coordination

## PREFACE

"I can think of no better example of what this Administration is trying to accomplish for the American people than the Federal-State program of vocational rehabilitation". This statement made by President Johnson in his Health Message to the Congress, August 10, 1965, explains the rapid growth of the vocational rehabilitation program during recent years. However, even in a program as universally accepted for its human as well as economic values as is vocational rehabilitation there is always need for objective measurement of results.

Examples of disabled persons who have been elevated from dependency and hopelessness to independence and self-esteem are legion. Recognition of the great value of vocational rehabilitation was reiterated in the 1965 Amendments to the Vocational Rehabilitation Act which, in many different ways, calls for expanded services to increased numbers of disabled persons.

The economic values of rehabilitation both to the rehabilitated individual and to the nation have always had a very prominent place in the dynamic forward thrust of the program. This cost benefits study gives further evidence of the impressive and important economic consequences of vocational rehabilitation.

This exploratory study is an important step in a continuing response to Secretary Gardner's call for a departmental Planning, Programming and Budgeting System.

Mary E. Switzer
Commissioner
Vocational Rehabilitation Administration

# EXPLORATORY COST-BENEFITS ANALYSIS OF VOCATIONAL REHABILITATION--
Measurement of the increased value of earnings and work activity over a lifetime due to vocational rehabilitation services

## I. Introduction

The Federal-State Program of Vocational Rehabilitation provides a wide variety of services to persons with mental and physical disabilities to enable them to participate in gainful activity to the limit of their abilities. The benefits of this program accrue not only to rehabilitated persons but also to their families and communities; not only to private sources, but also to the Federal and State governments. These benefits can be as obvious and tangible as an increase in earnings among the disabled or as intangible as a heightened sense of independence and integrity among these persons.

Measurement of the total benefits of a program relative to its costs has become an increasingly more important undertaking in governmental circles in recent years. A memorandum from the Secretary of the United States Department of Health, Education, and Welfare, dated January 12, 1966, announced the establishment of the office of the Assistant Secretary for Program Coordination. This office was charged with the responsibility for the Planning-Programming-Budgeting system that was to be developed in the executive branch of government by directive of the President.

This exploratory, and partial, cost-benefits analysis for vocational rehabilitation was prepared in response to the Secretary's charge. It focuses on one among many benefits of vocational rehabilitation. This benefit is the increase in lifetime earnings of disabled persons (whose cases were closed in fiscal year 1966) attributable to their receipt of vocational rehabilitation services under the Federal-State Program, per unit of expenditure on these persons. Stated differently, these lifetime earnings would have been lost had services not been received. It is hoped that even this incomplete effort will dramatically reveal the impressive gains to be derived from this program and will point the way to similar analyses for select groups of clients by disability classes, age groups, public assistance and family income statuses, etc. It is also hoped that this study will lead to greater and more detailed research to document the value of other benefits of the program that currently elude the process of quantification. Before proceeding, a few words on the nature of cost-benefits analysis are in order.

An all-encompassing cost-benefits analysis tries to identify and measure <u>all</u> consequences of a particular program in relation to <u>all</u> the expenditures required to effect these consequences. The analysis can be carried out for several proposed or existing lines of action to help administrators decide which of the alternatives will provide, among other possibilities, the greatest amount of positive consequences (or benefits) per unit of cost.

This report was prepared by Lawrence I. Mars, Statistician
Division of Statistics and Studies, VRA

The expression "all consequences" means not only the most easily measurable benefits but also those that are not readily quantifiable or are intangible. The unmeasurable and the intangible may constitute a considerable or even major proportion of a given program's effects. Indeed, Section VIII of this report is devoted solely to a delineation of the human and social benefits of vocational rehabilitation. Nonetheless, conducting a cost-benefits analysis even for a program with hard-to-measure effects can be of incalculable aid in any administrative process for the following reasons: "(This analysis) results in a more complete listing of factors to be taken into account in budgeting a program than would otherwise be the case. It compels one to recognize how much or how little is known about the several factors. Finally, it can lead to a formulation of approaches and methods to obtain the knowledge that is needed but lacking. Arranging the available information in systematic fashion throws light on the question of priorities for pursuing such knowledge"1/. In short, "benefit-cost analyses can provide an appropriate framework for decision makers to use in organizing the evidence and clarifying their thoughts and intuitions regarding alternatives."2/.

This exploratory analysis for vocational rehabilitation does not fully live up to all the essentials of a cost-benefits analysis for three reasons. First, only one major benefit is considered--increased lifetime earnings--while other benefits, even the economic ones, are omitted. Second, cost figures used refer to the basic support program of vocational rehabilitation services to individuals, and omit costs of the research, training, facilities and international programs of the Vocational Rehabilitation Administration. Third, the concept of cost-benefits analysis as a way to assess alternative methods of operations is not readily adaptable to vocational rehabilitation. Since the program aims to enable all disabled persons who need and can use services "to participate in work and in the limits of our society"3/, it would be both calculating and callous indeed to render services to one group of persons to the exclusion of another because a higher ratio of benefits to cost can be derived. It should immediately be stated, however, that differences in the benefits per unit of cost between groups of disabled persons have

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1/ Herbert E. Klarman, Present Status of Cost-Benefits Analysis in the Health Field. (From a paper presented to the 94th Annual Meeting of the American Public Health Association, at San Francisco, California on November 1, 1966).

2/ Joseph D. Crumlish, Notes on the State-of-the-Art of Benefits-Cost Analysis as Related to Transportation Systems, National Bureau of Standards, Technical Note 294, (Washington: U.S. Government Printing Office, November, 1963), p. 12.

3/ Russell J. N. Dean and Miriam M. Stubbs, "Vocational Rehabilitation of the Disabled", Health, Education, and Welfare Indicators, (April, 1966), p. 20.

enormous implications for guidance in planning to better serve these groups of persons.

Implicit in the judgment of a program's value and effectiveness is the presence of sound, accurate and current information. The foundation of any cost-benefits analysis is more sturdy and believable in proportion to the use of actual and not estimated, interpolated or assumed data. We were fortunate, indeed, to have available reliable data on wages of rehabilitated wage earners both at the time of their acceptance for rehabilitation services and at the time their cases were closed as rehabilitated. Inferences had to be made, however, of the degree to which clients would have their employment terminated by death, new or recurrent disability or retirement in the years after rehabilitation. These inferences would not have had to be so extensive or tortuous were there available information from followup studies of disabled persons who received vocational rehabilitation services. Although a few dozen such studies have been conducted, they have limited coverage and tend to be incomplete in their presentations of results. The fact that their results show variations from one another adds to the difficulty of interpreting them.

With the recent revision (beginning July 1, 1966) of the statistical reports required of State vocational rehabilitation agencies a variety of heretofore unavailable detail about clients of these agencies will be reported. The pressure to describe characteristics of clients belonging to specific groups such as the poor, those in institutions, the stroke victim, the public offender, etc., will mount as will the need and desire to learn of the long-range <u>effects</u> of serving these groups of persons. For this reason, this analysis can be considered a sort of preamble to more specific analyses of particular classes of clients on both national and State bases.

It should be repeated that the clients in this study were rendered services under the Federal-State Program of Vocational Rehabilitation. Clients in private and other public programs were not included. Additionally, because of the very specific focus of this analysis no consideration was taken of the possibility that without the Federal-State Program of Vocational Rehabilitation clients may well have been able to receive attention elsewhere through the years. Thus, the estimates of increased lifetime earnings due to vocational rehabilitation services may be overstated if looked at from the purview of the economy as a whole.

## II. Overall Summary

This exploratory cost-benefits analysis found that because of vocational rehabilitation services, clients whose cases were closed during fiscal year 1966 will experience an increase of $35 in their earnings and value of work activity over their working lives for every dollar expended on them.*

The four groups of clients for whom estimates were derived are shown as follows:

| Group | Number of closed cases | Lifetime earnings or value of work activity based on: Earnings or value of work at closure | Earnings or value of work at acceptance a/ | Assumed future earnings a/ | Increase in lifetime earnings or value of work due to VR services b/ | Increase per dollar of cost ($147 million) c/ |
|---|---|---|---|---|---|---|
| | | Millions of dollars | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Rehabilitated wage earners | 127,824 | 5,312 | 485 | 345 | 4,482 | $30.50 |
| Rehabilitated homemakers and unpaid family workers | 24,127 | 737 | 69 | --- | 669 | 4.55 |
| Rehabilitated self-employed farmers | 2,328 | 98 | 9 | --- | 89 | 0.60 |
| Not rehabilitated closed cases | 48,969 | 9 | 1 | --- | 7 | 0.05 |
| Total | 203,248 | 6,156 | 565 | 345 | 5,246 | $35.70 |

a/ The figures in this column represent earnings that cannot be attributed to VR services.

b/ Col. (2) less col. (3) less col. (4). c/ Col. (5) ÷ $147 million.

NOTES: All lifetime estimates are discounted at 4%. Some figures do not add because of rounding.

*In his book, "The Economics of Vocational Rehabilitation," Dr. Ronald Conley shows increased future outputs of $17 due to rehabilitation per dollar of program expenditure in fiscal year 1963. (p. 82).

## III. The Rehabilitated Wage Earners[4/]

### A. Methodology - General

The main factors considered in deriving an estimate of the increase in lifetime earnings of rehabilitated clients attributable to vocational rehabilitation services were:

1. the rates of death and new or recurrent disability among clients causing termination of employment through the years
2. the number of years of work-life for remaining clients until retirement
3. the earnings associated with clients remaining in employment through the years
4. the present value of future earnings
5. the change in amount of productivity of workers in the future.

These factors were always to be considered, even under the assumption that vocational rehabilitation services were not rendered.[5/]

Earnings at the time of rehabilitation closure among wage-earning clients were projected over an estimated remaining working lifetime. From these total lifetime earnings two amounts were subtracted. The first amount was an estimate of the lifetime amount of earnings of clients, based on earnings at the time of acceptance for rehabilitation services. A second amount was an estimate of lifetime earnings of clients who, although not working at the time of acceptance were, nonetheless, believed able to obtain some earnings eventually without the benefits of vocational rehabilitation services.

Both of these two amounts represented earnings that could not be attributed to the receipt of services. The difference, therefore, between the total lifetime earnings, based on earnings at closure, and the sum of the two types of earnings not attributable to vocational rehabilitation were the increased lifetime earnings due to vocational rehabilitation.

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4/ This expression was used, for convenience only, to include persons who were self-employed non-farmers.

5/ Additionally, these factors were present even when the analysis turned to the homemakers and unpaid family workers, self-employed farmers and the not rehabilitated clients.

B. Methodology - Specific

1. Lifetime earnings, based on earnings at closure

The following describes the procedure used to estimate the total lifetime amount of earnings:

$$\sum_{i=1}^{6} Nci \sum_{t_i}^{T_i} (1 - r_{ci})^{t_i} \; Wc \; (1 + p/1 + d)^{t_i}$$

where

Nci = the number of rehabilitated wage earners in the "i"th age group.

$t_i$ = an index indicating successive yearly intervals after rehabilitation for the "i"th age group.

$T_i$ = the time span in years over which wages might be earned by clients in the "i"th age group.

$r_{ci}$ = the probability that employment will be terminated because of death or disability in the "t"th year after rehabilitation for the "i"th age group.

Wc = the mean annual rate of earnings, based on weekly earnings at closure.

p = the expected annual percent increase in productivity.

d = the yearly discount rate for future earnings.

a. The number of clients

The number of rehabilitated wage earners, by age was:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 29,281 | 45 to 54 years | 20,618 |
| 20 to 34 years | 39,531 | 55 to 64 years | 11,575 |
| 35 to 44 years | 24,590 | 65 years and over | 2,229 |

(Appendix A shows the derivation of the number of clients, by age.)

b. The number of years of earnings

The assumed retirement age for persons in the first four age groups (through age 54) was 62. For the age group 55 to 64 years old, 65 was the assumed retirement age while for clients 65 years old and over, it was 70.

Arguments for higher and lower assumed retirement ages both seem reasonable. One can argue, for example, that disabled persons are more likely to weary of work through the years and will, therefore, retire sooner than would non-disabled persons. On the other hand, rehabilitated workers tend to be in the lower economic strata of society and would likely feel compelled to earn as much money as possible for as long as they can. Whatever the retirement age, a crucial underlying assumption in the computation of earnings until retirement age is that vocational rehabilitation services can have positive discernible effects for a long time, even forty or more years.

The average length of time to rehabilitate a client once he is accepted for services is about one year. Subtracting the median age of each age group plus one year from the assumed retirement ages yielded the number of future years for which wages might be earned. These were:

| Age group | Years of earnings | Age group | Years of earnings |
|---|---|---|---|
| Under 20 years | 43 | 45 to 54 years | 11 |
| 20 to 34 years | 34 | 55 to 64 years | 4 |
| 35 to 44 years | 21 | 65 years and over | 2 |

(See Appendix B for details)

The number of years for which increased earnings were computed after termination of vocational rehabilitation services was the same for rehabilitated homemakers and unpaid family workers, self-employed farmers and the not rehabilitated clients.

c. Percent of clients not expected to reach retirement age

Both death and new or recurrent disability will take their toll of rehabilitated clients through the years after rehabilitation. The number of clients still employed in any given year is needed to determine the aggregate amount of earnings for that year. Information for neither of these two prime causes of employment termination was readily available so interpolations from secondary sources had to be made.

(1) death rates - For the population as a whole a great many statistics are available for numbers of deaths by age, sex, race, etc. Data on deaths among disabled persons, however, are not as conspicuous.

On an a priori basis it seemed reasonable to assume that death rates among the disabled exceeded those in the general population. Yet, this thought was tempered by the fact that the most severely disabled individuals are not likely to be eligible for vocational rehabilitation services under the Federal-State Program. Vocational rehabilitation counselors "must establish that there is a reasonable expectation that vocational rehabilitation services, when completed, will lead to an individual's employment."6/ If this cannot be established, then an individual cannot be accepted for vocational rehabilitation services. Additionally, many vocational rehabilitation clients may be limited by a single disability, such as paralyzed or missing limbs, speech impediments, deafness, etc., which do not in themselves have implications for reduced longevity. Indeed, for the only year for which information is available, three quarters of all rehabilitated clients in fiscal year 1960 had no secondary disabling condition. This fact is, however, tempered by the consideration that these clients could still have had any number of non-disabling chronic conditions which might eventually endanger their health.

One of the sources showing deaths was Social Security. However, deaths among workers insured by Social Security cannot be used as a base since recipients include persons with terminal illnesses who would not be eligible to receive services under the Federal-State Program of Vocational Rehabilitation.7/

Published results from studies following up rehabilitation clients are incomplete and inconclusive. For example, a Utah study8/ processed 629 case records of persons to whom services were terminated three to eight years prior to the study. At the time of the study, 430 of these persons were known to be living and 29 had died. The others could not be located. These published data could not have been utilized in this analysis primarily because death rates by age or by specific number of years after closure were not available.

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6/ John F. McGowan (ed.). An Introduction to the Vocational Rehabilitation Process (Washington: Government Printing Office, 1961), p. 112.

7/ From the 1964 Annual Statistical Supplement to the Social Security Bulletin, p. 21, disability, (for the purpose of receiving disability benefits) is partially defined as "the inability to engage in any gainful activity by reason of any medically determinable physical or mental impairment that can be expected to result in death ....."

8/ University of Utah Graduate School of Social Work, The Influence of Emotional, Social, and Physical Factors on Vocational Rehabilitation Adjustment: Utah Preliminary Report, (Salt Lake City, October, 1958), p. 5.

A State of Washington study[9/] followed up 736 clients rehabilitated five years before the study and learned of 32 deaths. However, here again, neither the age groupings nor the year of death since rehabilitation was shown for these 32 persons. Even if these data were available, it is possible that the small number of deaths involved could not have been used with a high degree of confidence in their statistical reliability.

A source of incalculable value to us in the assignment of death rates was the 1951 Impairment Study of the Society of Actuaries.[10/] For this study, 27 of the largest life insurance companies accounting for 70% of the ordinary life insurance in force in the United States and Canada on December 31, 1950, reported on the number of deaths made in the period 1935-1949. Included in the reports were deaths among persons who had been insured under sub-standard policies because of the presence of certain chronic conditions. It is this group of persons that was likened to rehabilitated clients, the major similarity being the presence of one or more chronic conditions. It is probably true that some vocational rehabilitation clients would not be able to obtain even these sub-standard policies but it is also true that other disabled clients would be able to obtain the standard policies. Although there is reason to believe that the latter would predominate, the assumption was made, nonetheless, that rehabilitated clients would all have been able to obtain only sub-standard policies if they applied for life insurance. This assumption led eventually to higher death rates and fewer clients remaining employed each year.

The number of policies terminated by death among those with sub-standard policies was compared to the expected number of deaths, the latter being based on actual deaths from 1935-1949 among insured persons of reporting companies issued ordinary policies at standard rates. This comparison gave the mortality ratio. When the ratio exceeded 100%, the deaths among the sub-standard policyholders was in excess of deaths among the standard policyholders. When the ratio was less than 100%, the opposite was true. The mortality ratios were computed for the only four age groups shown in the study by summing the actual and expected number of policy terminations caused by death for each age group, over 86 classes of applicable conditions for which the desired detail was available. By "applicable condition" we mean a condition that might conceivably be the basis of a disability. Thus, sub-standard policies issued because of a poor family medical history were excluded from the computations. The resulting ratios were as follows:

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9/ Washington State Research Council, Vocational Rehabilitation Results in Washington State, (January, 1961), p. 14. This report was presented to the Washington State Board of Vocational Education.

10/ The Society of Actuaries, Impairment Study - 1951, (April, 1954).

| Age group | Mortality ratios |
|---|---|
| 15 to 29 years | 201% |
| 30 to 39 years | 177% |
| 40 to 49 years | 158% |
| 50 to 64 years | 128% |

The ratios were then applied to the 1964 death rates, by single years of age, for the general population found in the Statistical Abstract.11/ Vocational rehabilitation clients over 64 years of age were assigned mortality ratios of 1.28 (the same as for persons 50-64 years old) which was probably too high. No attempt was made to graduate the ratios within and between age groups, by single years.

The decline in the mortality ratios in the higher age groups might be explained in this manner: the most severely disabled are likely to die in the earlier years while those with more manageable disabilities are able to survive into the later years at which time the death rates among the general population markedly increase. The death rates then, between the disabled and general populations are thus drawn more closely together.

(2) disability rates - Trying to determine what proportion of rehabilitated workers would become disabled again to the point where they could no longer work, required finding a population grouping as similar as possible in health and other characteristics as a group of rehabilitated clients. Follow-up studies of rehabilitated clients, interesting though some of them are, do not reveal enough information to enable us to incorporate their experience in this analysis. For example, the Utah study12/ found that 46 of 290 interviewed clients rehabilitated three to eight years before, were not working at the time of their interview. Only 29 of the 46, however, gave their old disability or new health problems as the primary cause of their unemployment. A more comprehensive study than this might have been able to show data on the unemployed by age, by single years after rehabilitation so that a trend of some sort might have been established.

Figures from the 1964 Annual Supplement to the Social Security Bulletin13/ presented some disability data. When the number of workers awarded

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11/ U.S. Bureau of the Census, Statistical Abstract of the United States: 1966 (Washington: U.S. Government Printing Office, 1966), p. 53.

12/ University of Utah Graduate School of Social Work, op. cit., p. 101.

13/ pp. 35, 53.

benefits because of disability in 1964 was compared to the number of living workers insured in the event of disability at the beginning of 1964, the resulting "disability" rates were quite small. The following table shows how small, by age:

| Age group | Percent of insured workers awarded disability benefits |
|---|---|
| Under 25 years | 0.02 |
| 25 to 34 years | 0.07 |
| 35 to 44 years | 0.17 |
| 45 to 54 years | 0.44 |
| 55 to 64 years | 1.27 |

(See Appendix C for details)

The argument against the use of these data is that the number of insured persons includes many who could not possibly be part of a potential vocational rehabilitation population because they are not handicapped while the number of beneficiaries excludes many persons who might be eligible for vocational rehabilitation services but not for Social Security disability benefits. Either of these will lead to percentages that most probably understate the disability drop-out rates.

A report from the Bureau of Labor Statistics[14/] shows that of an average of 72,179,000 persons employed during 1965, there was an average of 1,904,000 persons (2.6%) who were either not working or working part-time because of illness. This figure is inconclusive because illness does not necessarily indicate a disability leading to permanent loss of employment.

The source ultimately consulted for disability rates was the National Center for Health Statistics (NCHS) of the Public Health Service. The National Center presents data on the number of persons limited in their major activities by degree of limitation, type of major activity, age, sex, and other characteristics. One report[15/] shows the number of persons who became limited in the last year and who were working when they became limited. This statistic was utilized as approximating the situation of a rehabilitated vocational rehabilitation client becoming disabled again to the point where he could no longer work. The similarity is far from exact, however, because these newly limited workers did not necessarily

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14/ Monthly Report on the Labor Force (December, 1965), p. 40.

15/ U.S. National Health Survey, Duration of Limitation of Activity Due to Chronic Conditions: Health Statistics - B-31 - United States, July, 1959-June, 1960 (Washington: U.S. Government Printing Office, January, 1962).

drop out of employment and may have been able to continue to work with some adjustments in their environments. Additionally, some of these persons may not have really been workers as will be explained later on. Nonetheless, no other source, to our knowledge, could present us with comprehensive information that more closely resembled our subject population of rehabilitated workers becoming disabled in the last year.

The number of persons, by age, who became totally or partially limited in their major activity in the last year and who were working when becoming limited were as follows:16/

| Age group | Number |
|---|---|
| 17 to 44 years | 378,000 |
| 45 to 64 years | 504,000 |
| 65 years and over | 185,000 |

These persons had major activities of work, retirement and "other" in the last year. Excluded is the "keeping house" category which was used later on for rehabilitated homemakers and unpaid family workers.

Since major activity refers to the activity done for six or more months of the last year, it is possible for someone to have been retired for, let us say, eight months but who worked for the first four months of the last year until he became disabled and decided to retire. For this reason, then, persons classified as retired were included in the estimation procedure.

The "other"category can consist of persons who have become disabled after working fewer than six months but who have not yet stopped looking for work. Another example would be a person who worked for three months at the beginning of the year, became disabled and lost his job, looked for another job for four months and then retired for the last five months. This person's major activity is "other" because no one activity was done for six or more months. Because of these considerations persons classified as "other" in major activity were also included in the estimation procedure. Thus, this year's "retired" and "other" persons could have been last year's workers since they were, indeed, working in the last year when they became limited. These are other examples, however, of persons in the "retirement" and "other" groups who could not possibly conform to the picture of a rehabilitated worker becoming disabled again. For example, a person may have been retired all year last year but worked part-time on occasion to obtain some income over and above his monthly pension. If something happened to him while he was working, causing a limitation in his work activity, he would be included in the figures,

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16/ Ibid., p. 26.

quoted above, of the number of newly disabled. However, he could not possibly have been a rehabilitated client struck by new or recurrent disability in the last year.

The next step was to try to approximate the population of rehabilitated clients still working from which the newly disabled could have come. Thus the table[17] below shows the number of persons having one or more chronic conditions with major activities of work, retirement or "other".

| Age group | Number |
|---|---|
| 17 to 44 years | 18,295,000 |
| 45 to 64 years | 18,162,000 |
| 65 years and over | 6,841,000 |

Some of these persons were limited in their major activities and some were not. This sort of "mixture" would be expected of persons who had been rehabilitated--some limited in the amount and kind of work they can do but better off than before they received services and some not limited at all in work. However, these NCHS figures may not represent rehabilitated clients for at least two reasons. First, a rehabilitated client no longer having a chronic condition (e.g., a cataract was removed) could not be part of the NCHS figures just quoted since they are for persons with at least one chronic condition.

Second, the NCHS data include persons who did not work at all during the year and, therefore, could not possibly have been part of a group of rehabilitated clients working at some time during the year. The report from which these data came did not show how many were or were not workers for all or part of the last year, by activity status. However, a special tabulation from the NCHS[18], for somewhat different age groupings, enabled us to estimate the proportion of persons with one or more chronic conditions in the labor force. These proportions were:

| Age group | Percent |
|---|---|
| 17 to 39 years | 87.9 |
| 40 to 59 years | 93.5 |
| 60 years and over | 43.3 |

(The derivation of these percentages is shown in detail in Appendix D.)

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17/ Ibid., p. 18.

18/ This tabulation covered the same population and period (July, 1959-June, 1961) as did the publication B-36 entitled Chronic Conditions Causing Limitation of Activities.

The percentages may be an overstatement of the employment level because some persons in the labor force were undoubtedly unemployed for most or all of the year. However, they may be understatements because the number of persons working part or most of last year may exceed the number employed in the two-week period used to establish labor force status.

Applying these percentages to the three published age classes by which NCHS data were shown for the number of persons, previously cited, having one or more chronic conditions yielded the following results:

| Age group | Number |
|---|---|
| 17 to 44 years | 16,081,000 |
| 45 to 64 years | 16,981,000 |
| 65 years and over | 2,962,000 |

Dividing these figures into the number of the newly limited, previously cited, who were working when they became limited gave the following estimates used for the rates of drop-out from employment each year due to disability:

| Age group | Percent |
|---|---|
| 17 to 44 years | 2.4 |
| 45 to 64 years | 3.0 |
| 65 years and over | 6.2 |

These percents were not graduated within and between age groupings, by single years. They were then added to the death rates to arrive at an over-all rate of drop-out from employment for single years beginning with age 18 and ending with age 69. (Appendix E shows the drop-out rates in detail.)

Included in these figures are rehabilitated persons who may have to be rehabilitated again at some time in the future. In any one year, about 11% of rehabilitated clients have been rehabilitated at least once before. Although we have not tried to estimate the additional cost of rehabilitating a certain number of clients again, neither have we tried to estimate their increased earnings due to future rehabilitation. A further and more detailed analysis would have been required if we were dealing with more than one fiscal year.

Also, there are a few persons who will probably drop out of employment in the months after their rehabilitation not because of a recurrence of disability, but simply because of an inability to make a satisfactory adjustment to a work situation. This phenomenon could not be accounted for in the drop-out rates because of the inability to distinguish, from

our own or other sources, the volume of these drop-outs.

One further statement on the assumption that disability drop-out is permanent. There is every reason to believe that many rehabilitated clients, when their employment is curtailed for whatever reason, are able to return to employment. An individual may leave or re-enter employment any number of times in the years after rehabilitation. Thus, the Utah study[19/] informs us that of 290 clients rehabilitated three to eight years before the follow-up interview, about 17% were not employed up to a quarter of the time since rehabilitation, 8% not employed from a quarter up to three quarters of the time and another 12% not employed most of the time.

Thus, the assumption that employment stoppage is permanent is unrealistic. An inclusive follow-up study would yield data that could be employed directly in any further development of this cost-benefits analysis. In the meantime, the inflexible assumption made here can attribute earnings to persons who stop employment for reasons other than disability. On the other hand, it does not attribute earnings to those who drop out for disability reasons but who manage to come back to work to some degree.

(The death and disability rates computed for rehabilitated wage earners are shown in Appendix F).

d. Yearly earnings

Unpublished data from the Vocational Rehabilitation Administration for fiscal year 1966, showed that 127,826 wage-earning rehabilitated clients had mean earnings of $56.74 in the week before rehabilitation closure (see Appendix G). Projecting this to a yearly basis by multiplying by 50 gave $2,837 as the starting mean annual wage of rehabilitated wage-earners. This value was applied to each of the six age groupings; no attempt to estimate different wages for different ages was made. This is because rehabilitated persons are unlike the general working population in that the continuous work experience of the latter helps them to achieve higher earnings in the future while the former often have little or no continuous work experience in the near past. Therefore, the typical disabled person rehabilitated at age 40, for example, is not likely to have much, if any, advantage over the disabled person rehabilitated at age 30 as far as recent continuous work experience is concerned. Both are virtually starting from scratch. Other factors such as education, ability, nature of disability, etc., will determine wage differentials.

No estimate was made of supplemental earnings derived from employment such as employer contribution to life, health, and accident insurance.

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19/ University of Utah Graduate School of Social Work, op. cit., p. 101.

e. Productivity increases

It was assumed that increases in future years in the productivity of rehabilitated workers would be reflected in their earnings. There was no a priori way to determine if rehabilitated persons as a whole would show productivity increases in line with those for persons who did not need vocational rehabilitation services. It could be argued that the disabled have limitations restricting their output and that for a variety of reasons they may not be able to adjust satisfactorily to new working techniques designed to help improve productivity. On the other hand, rehabilitated clients are carefully placed only in jobs in which their chronic limitations have as small a handicapping effect as possible. Indeed, in some instances selective placement can eliminate vocational handicaps altogether. Additionally, even if rehabilitated clients start at productivity levels considerably below those of the non-disabled, there is no reason why they cannot exhibit productivity increases through the years as they become accustomed to their jobs and gather more experience as well as become more adjusted to their handicaps as time goes by. Because of these considerations, the assumption was made that yearly increases in productivity for rehabilitated clients and all other workers would be closely comparable.

Another problem was whether there were differences in productivity increases among occupational groupings. Generally, this sort of information is not available except in the very broadest terms. Thus, the annual rate of change in the Gross National Product per man-hour in 1958 dollars during 1957-1965 for the private sector of the economy was 5.8% for agriculture and 2.9% for the remainder of the private economy.20/ Applying these figures, respectively, to the 6,303 rehabilitated wage-earning farm workers and to the 121,523 other rehabilitated wage-earners gave a weighted average of 3.0%. Also, a statement in the Bureau of Labor Statistics' publication entitled "Productivity: A Bibliography" summarizes a cited source by saying "the author concludes that there is no sharp dichotomy in productivity behavior in the manufacturing and service components of the economy."21/ Because of the foregoing, 3.0% was used as the annual rate of productivity increase across all occupations.

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20/ Bureau of Labor Statistics, Projections 1970: Interindustry Relationships Potential Demand Employment, Bulletin 1536 (Washington: U.S. Government Printing Office, 1966), p. 28.

21/ Bulletin 1514 (Washington: U.S. Government Printing Office, July, 1966), p. 41. The work cited is by P. J. Dhrymes entitled "Comparison of Productivity Behavior in Manufacturing and Service Industries" which was published in the February, 1963 edition of the Review of Economics and Statistics, pp. 64-69.

f. Yearly discount rate for future earnings

A discount rate reflects the extra value of current earnings over an equal amount of earnings the following year. An aggregate of future earnings overstates the present value of those dollars unless discounting is applied. Discounting, therefore, tries to put a brake on exaggerating the value of future earnings. The amount of discounting is not readily agreed upon by economic analysts. A rate of 4% was applied in this analysis because of its common use and because it was the rate employed in similar studies within the U.S. Department of Health, Education, and Welfare.

g. Results

The calculations dictated by the formula shown in Section III B.1. above yielded $5,312 million as the amount of discounted lifetime wages to be earned by rehabilitated wage earners, based on their earnings at the time of rehabilitation closure.

2. Lifetime earnings, based on earnings at acceptance

The following formula describes the procedure used to estimate the total lifetime amount of earnings of rehabilitated wage earners who had earnings at acceptance. These wages would presumably have been earned without the benefit of vocational rehabilitation services and had to be subtracted from total lifetime earnings, based on earnings at closure.

$$\sum_{i=1}^{6} Nai \sum_{t_i}^{T_i} (1 - r_{ai})^{t_i} Wa\,(1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

Nai = the number of rehabilitated wage earners with earnings at acceptance in the "i"th age group.

$r_{ai}$ = the probability that employment for a rehabilitated wage earner having earnings at acceptance and assuming no vocational rehabilitation services will be terminated because of death or disability in the "t"th year after acceptance for the "i"th age group.

Wa = the mean annual rate of earnings based on weekly earnings at acceptance.

a. The number of clients

The number of rehabilitated wage earners having earnings at acceptance was as follows:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 6,499 | 45 to 54 years | 4,569 |
| 20 to 34 years | 8,769 | 55 to 64 years | 2,554 |
| 35 to 44 years | 5,477 | 65 years and over | 511 |

(See Appendix A for the derivation of the number of rehabilitated wage earners having earnings at acceptance, by age at acceptance)

b. The number of years of earnings

For each age grouping of wage-earning clients at acceptance, the number of years of earnings was one year more than for wage-earning clients at closure. Under the assumption of no vocational rehabilitation, persons with earnings at acceptance would not have had the benefit of services for a year. This extra year was presumably spent in employment. The number of years for each class was as follows:

| Age group | Years of earnings | Age group | Years of earnings |
|---|---|---|---|
| Under 20 years | 44 | 45 to 54 years | 12 |
| 20 to 34 years | 35 | 55 to 64 years | 5 |
| 35 to 44 years | 22 | 65 years and over | 3 |

(See Appendix B)

These same figures were used for the other groups of persons dealt with in this analysis who had earnings or work activity at acceptance.

c. Percent of clients not expected to reach retirement age

Disabled persons who continue to work without having had the benefits of vocational rehabilitation but who need services are not likely to remain employed for as long as persons who did, in fact, receive services. Therefore, higher rates of yearly drop-out from employment were derived.

(1) death rates - No changes in death rates were employed for disabled persons not receiving vocational rehabilitation services versus death

rates used for clients receiving services. This may be incorrect, and somewhat higher rates should, perhaps, have been employed. The use of higher death rates would have led to higher increased lifetime earnings due to vocational rehabilitation.

(2) disability rates - These rates had to exceed the ones estimated for clients receiving vocational rehabilitation since it is clear that the absence of service makes it more difficult for persons to cope with and overcome their disabilities.

The same National Center for Health Statistics source previously employed in determining disability rates among those receiving vocational rehabilitation was used again.22/

The procedure involved comparing a group of workers becoming totally limited in work in the last year to a large group of workers who became partially or totally limited in work in the last year. Both groups were working when the limitations began. The basic fault of this approach is that those who became totally unable to work in the last year may not have been partially limited in work before that. This latter point is required of disabled workers without vocational rehabilitation who become further disabled to the point where they can no longer work.

Since no additional detail was available to us, we had to assume that our computations reasonably approximated drop-out rates among those employed but already limited in work.

The estimated disability drop-out rates came to:

| Age group | Percent |
|---|---|
| 17 to 44 years | 9.4 |
| 45 to 64 years | 8.4 |
| 65 years and over | 9.9 |

(See Appendix H for the computations of the rates of disability. Appendix F shows death rates and disability rates by single year of age.)

d. Yearly earnings

Unpublished VRA data showed that there were 28,379 rehabilitated wage earners who had earnings at acceptance. The aggregate weekly earnings of these persons was $44.23. Projecting to an annual basis by multiplying by 50 gave $2,211 as the mean annual wage. This figure was used for each age class. (See Appendix G)

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22/ U.S. National Health Survey, B-31.

e. Productivity and discount

No changes in productivity increases or discount rates were made from those already used. Strictly speaking, though, it seemed reasonable to assume that disabled workers not having vocational rehabilitation services would not be likely to exhibit a productivity increase as large as that for the disabled who received vocational rehabilitation. Nonetheless, there was no information to confirm this.

f. Results

The calculations dictated by the formula shown in Section III B.2. above yielded $485 million as the amount of earnings that could not be attributed to the receipt of vocational rehabilitation.

3. Lifetime earnings, based on assumed additional earnings without the help of vocational rehabilitation

Up to this point, no account has been taken of persons without earnings at acceptance who would probably have found employment even without the benefit of vocational rehabilitation services. This employment is not likely to be in keeping with their maximum potential earning power or level of skill which vocational rehabilitation could help them achieve, and may even involve danger to their health. Nonetheless, some earnings would be associated with this employment, none of which could be attributed to vocational rehabilitation and which is a subtraction from the lifetime earnings of rehabilitated wage earners, based on earnings at closure.

The following formula describes the procedure used to estimate these total lifetime earnings:

$$\sum_{i=1}^{6} Ki\ Nci \sum_{t_i}^{T_i} (1 - r_{ai})^{t_i}\ Wa\ (1 + p/1 + d)^{t_i}$$

where, for the term not previously defined,

Ki = the percent of all rehabilitated wage earners who could earn wages eventually without vocational rehabilitation services, in the "i"th age group and who had no earnings at acceptance.

a. The number of clients

From the National Center for Health Statistics[23/], the number of persons partially or totally limited in their major

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23/ Ibid., p. 26.

activity of work was likened to a group of disabled persons needing vocational rehabilitation services. Of these limited persons, a certain number were not working when they became limited. This latter group was likened to a group of disabled persons who found jobs without vocational rehabilitation help despite their limitations and they accounted for the following percents of all persons limited in their major activity of work:

| Age group | Percent |
|---|---|
| 17 to 44 years | 18.1 |
| 45 to 64 years | 7.7 |
| 65 years and over | 9.0 |

These were used as the percents of the rehabilitated who could eventually have found earnings even without the help of vocational rehabilitation. (See Appendix I for details)

The 18.1% figure was applied to the total number of rehabilitated wage earners in each of the first three age groups, 7.7% to the next two age groups and 9.0% to the last one.

The estimated number of persons were:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 5,300 | 45 to 54 years | 1,588 |
| 20 to 34 years | 7,155 | 55 to 64 years | 161 |
| 35 to 44 years | 4,451 | 65 years and over | 201 |

As with the other interpolations of data from the National Center for Health Statistics, the make-up of the groups represented by these data included persons who could not have been vocational rehabilitation clients. Thus, the number of persons not working when they became limited could have included those who retired after working for, let us say, nine months, and then became disabled two months later. Nonetheless, the majority of persons probably found employment <u>after</u> becoming limited.

b. <u>The number of years of earnings</u>

It was assumed that these non-workers at acceptance could have had earnings within a year thereafter. This is probably incorrect and it had the effect of attributing more lifetime earnings to these persons without the benefits of vocational rehabilitation services than should have been the case. No figures were available, however, to apportion the finding of employment over the course of years. The number of years

of earnings then, were the same as for clients with earnings at closure (see Section III B.1.b. above).

c. Percent of clients not expected to reach retirement age and yearly wages

For both these characteristics the same figures used for clients with earnings at acceptance (Sections III B.2.c. and d. above) were also used for those who would eventually obtain earnings.

d. Productivity increases and discount rate

No changes were made in these rates from those previously used.

e. Results

It was estimated that clients without earnings at acceptance could have earned a total of $345 million during their working lives without the benefits of VR services.

4. Summary

It was estimated the earnings of rehabilitated wage earners will be increased by $4,482 million over the course of their working lives, because they received VR services under the Federal-State Program. This was derived by subtracting the sum of earnings not attributable to VR ($485 million, based on earnings at acceptance plus $345 million, based on assumed "eventual" earnings) from the lifetime earnings, based on earnings at closure, (or $5,312 million).

When the increased earnings of $4,482 million was compared to the total cost of $147 million for all persons (not only the wage earners), the contribution to the overall increase in lifetime earnings per dollar of expenditure came to $30.50.

## IV. Rehabilitated Homemakers and Unpaid Family Workers

### A. Methodology - General

Evaluation of the economic benefits resulting from the rehabilitation of homemakers and unpaid family workers is made difficult because a price is not paid directly for these services. Outputs from these activities do not explicitly enter the national income accounts. Nonetheless, it was felt necessary to estimate a value for these work activities. Additionally, since one in every six rehabilitations is of a homemaker and unpaid family worker, this group as a whole could not be ignored.

It has been said that the value of a homemaker's[24/] activities are so great that they exceed any reasonable monetary designation. This, however, cannot be used as an argument against assigning some economic value, however small, to a homemaker's work. We tried to use some estimate that none could question as a minimum and which, if applied to the work of rehabilitated homemakers, would lead to a more accurate approximation of the effects of vocational rehabilitation services than if no value had been assigned. A low, conservative assessment of the value of homemaking should in no way lead to a misunderstanding or depreciation of a homemaker's true worth which this analysis makes no attempt to appraise.

As with the rehabilitated wage earners death, disability, productivity and discount factors were considered in regard to homemakers and unpaid family workers. Also, since wages are inapplicable to this group, value of the work activity had to be determined, both at acceptance and at closure.

The lifetime value of work activity, based on activity at acceptance was subtracted from the lifetime value of work activity, based on activity at closure. The difference was the increase in the value of work activity due to VR services.

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24/ The emphasis in this section is heavily toward the homemaker as against the unpaid family worker. This is because the number of rehabilitated homemakers was about six to seven times greater than the number of unpaid family workers.

B. Methodology - Specific

1. Lifetime value of work activity, based on estimated value at closure

The following formula describes the procedure used to estimate the total lifetime value of work activity:

$$\sum_{i=1}^{6} Nhi \sum_{t_i}^{T_i} (1 - r_{di})^{t_i} V_h (1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

$N_{hi}$ = the number of rehabilitated homemakers and unpaid family workers in the "i"th age group.

$r_{di}$ = the probability that work activity will be terminated because of death or disability in the "t"th year after rehabilitation for the "i"th age group.

$V_h$ = the mean annual value of work activity based on estimated activity at closure.

a. The number of clients

The number of homemakers and unpaid family workers by age were:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 5,526 | 45 to 54 years | 3,884 |
| 20 to 34 years | 7,456 | 55 to 64 years | 2,171 |
| 35 to 44 years | 4,656 | 65 years and over | 434 |

(Appendix A shows the derivation of the number of clients by age.)

b. The number of years of homemaking activity

As previously stated, the number of years of calculations was the same for all groups in this analysis.

A retirement age is admittedly unrealistic for homemakers since they do not "retire" as such but usually manage to find some activity around the house to engage their interests. However, no purpose beyond over-precision would be served by continuing the years of work activity interminably. The amount of bias is

relatively small and leads to a lowered estimate of increased value of work activity (see Section III B.1.b. for the number of years, by age.)

c. Percent of clients not expected to reach retirement age

(1) death rates - The mortality ratios derived from the 1951 Impairment Study[25] were applied to the single year 1964 death rates among white females[26]. Not all homemakers and unpaid family workers were white females and the fiscal year 1966 characteristics data do not show the sex and race classifications of rehabilitated clients. However, it was felt that virtually all homemakers were women while about 80% of the women were probably white. This last figure is the proportion among all State VR clients experienced in recent years.

(2) disability rates - From the NCHS[27], the number of females with a major activity of housekeeping, who became partially or totally limited in the last year was divided by the number of homemakers having one or more chronic conditions. The results were:

| Age group | Percent |
|---|---|
| 17 to 44 years | 2.2 |
| 45 to 64 years | 2.9 |
| 65 years and over | 4.5 |

(Appendix J shows the computational details)

These percents were used as the disability drop-out rates for homemakers and unpaid family workers. They are subject to the same criticisms levelled at the drop-out rates derived for the wage earners. This would include the fact that becoming limited does not necessarily mean that work activity can no longer be performed. Other points of issue are whether the population of housekeepers with chronic conditions adequately reflects a population of rehabilitated homemakers and whether the population of newly limited homemakers adequately reflects a population of rehabilitated homemakers becoming disabled again.

(The death and disability rates computed for homemakers and unpaid family workers are shown in Appendix K.)

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25/ The Society of Actuaries, op. cit.

26/ Statistical Abstract, op. cit., p. 53.

27/ U.S. National Health Survey, B-31, op. cit., pp. 18, 24.

d. Value of yearly work activity

Earnings data were not collected by the VRA for homemakers and unpaid family workers and estimates had to be made, therefore, for the value of their work activity.

The estimation procedure involved finding values for homemakers and unpaid family workers separately and then obtaining a weighted average of the two based on past data showing that the ratio of homemakers to unpaid family workers has been about 6.5 to 1.

(1) homemakers -- Homemakers' services were valued at the mean wage of a full-time maid. "Alternative procedures are in terms of what it takes to replace the housewife at home or what it takes to bring her into the labor market"28/.

A full-time maid is variously called general maid or home housekeeper or homemaker. These expressions are found in the latest edition (1965) of the Dictionary of Occupational Titles, Volume I.29/ The activities of this person, as described by the Dictionary, include any or all of the following: planning meals; purchasing foodstuffs and household supplies; preparing and cooking food; serving meals and refreshments; washing dishes; cleaning silverware; overseeing activities of children; assisting children in bathing and dressing; housecleaning; changing linens and making beds; washing, mending and ironing clothes; answering telephone and doorbell; and feeding pets.

Unpublished data from the Bureau of Census showed mean earnings for female private household workers in 1964. This was $1,832 for full-time unrelated individuals working 40 to 52 weeks.

By "unrelated" was meant that the individual was not living with any relatives. By using the concept of the "unrelated" individual we tried to approximate as closely as possible the situation of the "live-in" private maid. It was felt that the "live-in" maid's activities were likely to approach in scope and variety the activities of a homemaker. Mean, rather than median, earnings were used because they are more representative of household workers as a whole.

(2) unpaid family workers -- These rehabilitated workers can be males as well as females. Thus, in using Census Bureau data we had to include information for both males and females. Also, Census occupational categories included in our estimate were service, clerical and sales, and farmers and farm laborers. These occupational situations

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28/ Klarman, op. cit. (See footnote 1/ on page 2.)

29/ U.S. Department of Labor, Bureau of Employment Security (Washington: Government Printing Office, 1965), p. 440.

were thought to be the likeliest in which a rehabilitated unpaid family worker might find himself. Additionally, the Census figures used were for full-time workers who worked 40 to 52 weeks in 1964 and who were all related to the heads of the households of their families. The other two classes of workers, the "unrelated" individual and the head of household, seemed generally inapplicable here.

No estimate was made of the value of food and shelter received by homemakers and unpaid family workers. Since these values were probably the same with or without VR services no account was taken of them in determining the increased value of work activity due to VR.

The estimated mean earnings of all homemakers and unpaid family workers came to $1,990. (See Appendix L for the details of the computations).

e. Results

The calculations dictated by the formula shown in Section IV B.1. above yielded $737 million as the amount of discounted lifetime value of work activity of rehabilitated homemakers and unpaid family workers, based on their work activity at rehabilitation closure.

2. Lifetime value of work activity, based on estimated value at acceptance

The following formula describes the procedure used to estimate the total lifetime value of work activity, based on estimated activity at acceptance:

$$\sum_{i=1}^{6} N_{hi} \sum_{t_i}^{T_i} (1 - r_{bi})^{t_i} V_j (1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

$r_{bi}$ = the probability that work activity for a rehabilitated homemaker and unpaid family worker assuming no VR services will be terminated because of death or disability in the "t"th year after acceptance for the "i"th age group.

$V_j$ = the mean annual value of work activity based on activity at acceptance.

a. The number of clients

The number of clients at acceptance was the same as the number of clients at closure. Section IV B.1.a. above shows the numbers, by age. As previously mentioned, it was assumed that all homemakers

and unpaid family workers had some work activity at acceptance. Therefore, the number of active clients at acceptance and closure regardless of degree of activity was identical.

b. The number of years of earnings

See Section III B.2.b. above.

c. Percent of clients not expected to reach "retirement" age

(1) death rates - Again, death rates among the white female population were multiplied by the mortality ratios of the 1951 Impairment Study.

(2) disability rates - The drop-out rates among homemakers and unpaid family workers assuming no VR were obtained by computing the ratios, by age class, between the drop-out rates for the wage earners vs. the homemakers and unpaid family workers who were given VR services and applying the resulting ratios to those for wage earners without services. The drop-out rates, then, for homemakers and unpaid family workers were:

| Age group | Percent |
|---|---|
| 17 to 44 years | 8.6 |
| 45 to 64 years | 8.1 |
| 65 years and over | 7.2 |

(*See Appendix M for details* of the ratio estimation procedure. Also, Appendix K shows the combined death and disability rates by single years of age.)

d. Yearly value of work activity

The yearly value of work activity, based on activity at acceptance, was assumed to stand in the same proportion to the yearly value of work activity, based on activity at closure, as the earnings at acceptance of wage earners stood in relation to their earnings at closure.

The mean annual rate of earnings among rehabilitated wage earners at acceptance was based on aggregate earnings of 28,379 persons with earnings at acceptance averaged over all 127,826 rehabilitated wage earners. This resulted in a mean of $491, or about 17% of the $2,837 annual rate of earnings at closure of wage earners. It was, therefore, assumed that 17% of the $1,990 value of work activity at closure of homemakers, etc., would be the value of work activity at acceptance. This came to $344.

No estimate was made of the value of work activity that some persons, not active at acceptance, would have obtained eventually without VR. The number of these persons, particularly among homemakers, was believed to be small since handicapped homemakers can quite often manage to do some, however few, of their homemaking tasks. Therefore, it was assumed that all homemakers and unpaid family workers were able to perform some amount of activity at acceptance to which the aforementioned value was assigned.

e. Results

The calculations dictated by the formula shown in Section IV B.2. above yielded $69 million as the amount of discounted lifetime value of work activity of rehabilitated homemakers and unpaid family workers, based on their activity at acceptance.

3. Summary

It was estimated that the value of work activity of homemakers and unpaid family workers will be increased by $668 million over the course of their working lives, because they received VR services under the Federal-State Program. This was derived by subtracting the value of work activity, not attributable to VR ($69 million), from the lifetime value of work activity, based on activity at closure, of $730 million.

When this increased value of $668 million was compared to the total cost of $147 million for all persons (not only the homemakers), the contribution to the overall increase in lifetime earnings per dollar of expenditure came to $4.55.

## V. The Rehabilitated Self-Employed Farmers

### A. Methodology - General

Among persons for whom earnings data were not collected by the VRA were self-employed farmers. There were about 2,300 of these persons for whom earnings had to be estimated.

The estimated lifetime earnings of self-employed farmers, based on their activities at acceptance, was subtracted from the estimated lifetime earnings, based on their activities at closure. The difference was the increase in lifetime earnings due to the receipt of VR services. Again, death, disability, productivity, and discount factors were an integral part of the estimation procedure.

### B. Methodology - Specific

#### 1. Lifetime earnings, based on estimated earnings at closure

The following formula describes the procedure used to estimate the total lifetime earnings:

$$\sum_{i=1}^{6} N_{fi} \sum_{t_i}^{T_i} (1 - r_{gi})^{t_i} V_k (1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

$N_{fi}$ = the number of rehabilitated self-employed farmers in the "i"th age group.

$r_{gi}$ = the probability that work activity will be terminated because of death or disability in the "t"th year after rehabilitation for the "i"th age group.

$V_k$ = the mean annual rate of earnings based on estimated income at closure.

##### a. The number of clients

The number of self-employed farmers by age were:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 533 | 45 to 54 years | 375 |
| 20 to 34 years | 719 | 55 to 64 years | 210 |
| 35 to 44 years | 449 | 65 years and over | 42 |

(Appendix A shows the derivation of the number of clients by age.)

b. The number of years of earnings

See Section III B.1.b. for the number of years, by age.

c. Percent of clients not expected to reach retirement age

(1) death rates - the mortality ratios derived from the 1951 Impairment Study[30] were applied to the 1964 death rates by single year among white males[31] since the rehabilitated self-employed farmers were probably all or nearly all white males.

(2) disability rates - From the NCHS[32] the number of males who became partially or totally limited in their major activity in the last year and who were working when they became limited was divided by the number of males having one or more chronic conditions less an estimated number believed not to be in the labor force[33]. (See Appendix N for the labor force estimate). The results were:

| Age group | Percent |
|---|---|
| 17 to 44 years | 2.3 |
| 45 to 64 years | 4.0 |
| 65 years and over | 7.4 |

(Appendix O shows the derivation of these percents.)

These percents were used as the drop-out rates. As pointed out in regard to wage earners and homemakers, limitation of activity does not necessarily imply elimination from employment. Also, whether NCHS populations can truly reflect what happens to rehabilitated persons is not ascertainable.

(The death and disability rates computed for self-employed farmers are shown in Appendix P.)

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30/ The Society of Actuaries, op. cit.

31/ Statistical Abstract, op. cit., p. 53.

32/ U.S. National Health Survey, B-31, op. cit., pp. 18, 24.

33/ From a special tabulation covering the same population and period as the U.S. National Health Survey publication, B-36, op. cit.

d. Yearly earnings

Earnings of self-employed farmers were not collected by the VRA and estimates had to be made using Census Bureau sources.

Again, for computational purposes, an arithmetic mean rather than a median was used. Unpublished Census data for 1964 revealed that the mean yearly earnings of farmers and farm laborers who worked full-time for 40 to 52 weeks and who were heads of households came to $2,981. This figure may understate the earnings of self-employed farmers because the lower earnings of farm laborers are included, but it may overestimate the true figure because it excludes the lower yearly earnings of non-heads of households and unrelated individuals.

e. Results

The calculations dictated by the formula shown in Section V. B.1. above yielded $98 million as the amount of discounted lifetime earnings of rehabilitated self-employed farmers, based on their estimated earnings at closure.

2. Lifetime earnings, based on estimated earnings at acceptance

The following formula describes the procedure used to estimate the total lifetime earnings of self-employed farmers, based on their estimated earnings at acceptance.

$$\sum_{i=1}^{6} N_{fi} \sum_{t_i}^{T_i} (1 - r_{ei})^{t_i} \, Vp \, (1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

$r_{ei}$ = the probability that a rehabilitated self-employed farmer will be no longer able to work because of death or disability in the "t"th year after acceptance for the "i"th age group.

Vp = the mean annual value of earnings, based on estimated activity at acceptance.

a. The number of self-employed farmers

The number of active self-employed farmers at acceptance was assumed to be the same as at closure. This may have been an error since it seems not unreasonable that a disabled farmer more resembles a disabled wage earner than a homemaker in that he may not, unlike the homemaker, be able to perform some of his duties before the receipt of VR services. If this was an error its effect was to raise the earnings of farmers without

VR services and lower the eventual estimate of increased lifetime earnings due to VR. Section V. B.1.a. above shows the number of clients used in the calculations by age.

b. The number of years of calculations

See Section III. B.2.b. above.

c. Percent of clients not expected to reach retirement age

(1) death rates - Death rates among the white male population[34] were multiplied by the mortality ratios of the 1951 Impairment Study.[35]

(2) disability rates - The drop-out rates among the self-employed farmers assuming no VR were obtained by computing the ratios, by age class, between the drop-out rates for the wage earners vs. the farmers who were given VR and applying the resulting ratios to the drop-out rates for wage earners without services.

The derived percents, then, were:

| Age group | Percent |
|---|---|
| 17 to 44 years | 9.0 |
| 45 to 64 years | 11.2 |
| 65 years and over | 11.8 |

(See Appendix Q for details of the ratio estimation procedure. Also, Appendix P shows the combined death rates and disability rates by single year of age.)

d. Yearly earnings

The yearly value of earnings at acceptance was assumed to stand in the same proportion to the yearly value of earnings at closure as the earnings at acceptance of wage earners stood in relation to their earnings at closure.

For wage earners this relationship was about 17% (See Section IV. B.2.d. above). Applying this to the $2,981 annual rate of earnings at closure for self-employed farmers yielded $516 as the estimate of the

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34/ Statistical Abstract, op. cit., p. 53.

35/ The Society of Actuaries, op. cit.

annual rate of earnings at acceptance.

e. Results

The calculations dictated by the formula shown in Section V. B.2. above yielded $9 million as the amount of discounted value of lifetime earnings of rehabilitated self-employed farmers, based on earnings at acceptance.

3. Summary

It was estimated that the lifetime earnings of self-employed farmers will be increased by $89 million over the course of their working lives because they received VR services under the Federal-State Program. This was derived by subtracting the value of lifetime earnings, not due to VR ($9 million), from the lifetime earnings, based on earnings at closure ($98 million).

When this increase of $89 million was compared to the total cost of $147 million on all persons (not only the farmers), the contribution to the overall increase in lifetime earnings per dollar of expenditure came to 60¢.

## VI. The Not Rehabilitated Wage Earners[36/]

### A. Methodology - General

In fiscal year 1966, there were 48,969 persons whose cases were closed as not rehabilitated. Some of these persons did not receive VR services other than guidance and counseling. Others received VR services of various kinds. It was assumed that benefits that accrue to not rehabilitated clients due to the receipt of vocational rehabilitation services could pertain only to those cases closed where a vocational rehabilitation plan had been initiated and where it was known that there were earnings at closure. A further, and obvious, requirement was that closure was for reasons other than death.

For this group of persons only, then, the lifetime value of their earnings at acceptance was subtracted from the lifetime value of their earnings at closure. The difference was the increase in earnings due to VR.

### B. Methodology - Specific

#### 1. Lifetime earnings, based on earnings at closure

The following formula describes the procedure used to estimate the total lifetime earnings:

$$\sum_{i=1}^{6} N_{qi} \sum_{t_i}^{T_i} (1 - r_{ci})^{t_i} W_q (1 + p/1 + d)^{t_i}$$

Where, for terms not previously defined,

$N_{qi}$ = the number of not rehabilitated wage earners in the "i"th age group.

$W_q$ = the mean annual rate of earnings, based on weekly earnings at closure.

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36/ This expression was used, for convenience only, to include persons who were self-employed nonfarmers.

a. The number of not rehabilitated wage earners

Except for the total number of 48,969 nothing else was reported to the VRA for the not rehabilitated closures of fiscal year 1966. A special study of not rehabilitated clients, conducted for fiscal year 1964, was used to project estimates of key characteristics for the fiscal year 1966 group.37/

Thus, the proportion of all FY 1964 not rehabilitated cases that were accounted for by cases closed after a VR plan was initiated was determined to be 46.7%.38/ This percentage was applied to the total of 48,969 not rehabilitated cases in FY 1966 to arrive at 22,869 as the estimate of cases closed in FY 1966 after a VR plan was initiated.

Then in order to find the number of these persons who might have had earnings at closure, we derived the proportion of all fiscal year 1964 post-VR plan closures who had earnings at closure and applied this proportion to the estimate of the number of fiscal year 1966 post-VR plan closures. The result was an estimate of the number of wage earners at closure in fiscal year 1966 of 272. The likelihood is high that there were many more wage earners at closure. However, it was felt to be too conjectural to estimate the number of these presumed wage earners because of the extraordinary complexities involved in trying to assess the benefits of VR to a population of persons who did not achieve total rehabilitation success. Reports for fiscal year 1967 and thereafter should be helpful since type of benefits will be recorded, even for the not rehabilitated.

(Appendix $R_1$ shows this last ratio estimate.)

The 272 were then apportioned to the six age classes using the fiscal 1964 age distribution (See Appendix $R_2$).

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37/ Vocational Rehabilitation Administration, The Not Rehabilitated Clients - Fiscal Year 1964: Rehabilitation Service Series Number 66-1, Supplement 11, April, 1966.

38/ Ibid., p. 27.

The number of not rehabilitated wage earners by age were:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 39 | 45 to 54 years | 58 |
| 20 to 34 years | 79 | 55 to 64 years | 32 |
| 35 to 44 years | 60 | 65 years and over | 4 |

b. The number of years of earnings

See Section III B.1.b. for the number of years, by age.

c. Percent of clients not expected to reach retirement age

The death and disability rates used were identical to the ones for the rehabilitated wage earners. While one does not usually expect not rehabilitated clients to fare as well as the rehabilitated, it should be borne in mind that this particular group of not rehabilitated clients received all or some of the planned VR services and were known to be earning wages at closure, and was therefore a very select group among the not rehabilitated. In short, the group was as close to a rehabilitated population as our data permitted us to learn about.

d. Yearly earnings

Data for fiscal year 1964 showed that not rehabilitated wage earners whose cases were closed for reasons other than death after plan initiation were earning an average of $48.46 a week or, on an annual basis, $2,423. (See Appendix S). This same wage amount was applied to the not rehabilitated closures of fiscal year 1966.

e. Results

The calculation dictated by the formula shown in Section VI. B.1. above yielded $8.8 million as the amount of discount lifetime wages to be earned by not rehabilitated wage earners whose cases were closed after VR plan initiation.

2. Lifetime earnings, based on earnings at acceptance

The following formula describes the procedure used to estimate the total lifetime amount of earnings of not rehabilitated wage earners who had earnings at acceptance.

$$\sum_{i=1}^{6} N_{si} \sum_{t_i}^{T_i} (1 - r_{ai})^{t_i} W_s (1 + p/1 + d)^{t_i}$$

where, for terms not previously defined,

$N_{si}$ = the number of not rehabilitated wage earners at acceptance in the "i"th age group.

$W_s$ = the mean annual rate of earnings, based on weekly earnings at acceptance.

a. The number of clients

The number of persons in fiscal year 1964 whose cases were closed for reasons other than death subsequent to initiation of a VR plan and who were employed at closure was 314.[39/] Of these persons, 116 or 36.9%, had also been employed at acceptance. Applying this percentage to the previously used estimate of 272 wage-earning clients at closure in fiscal year 1966 yielded 100 as the estimate of the number of wage earners at acceptance.

This number, by age groups, was:

| Age group | Number | Age group | Number |
|---|---|---|---|
| Under 20 years | 14 | 45 to 54 years | 21 |
| 20 to 34 years | 29 | 55 to 64 years | 12 |
| 35 to 44 years | 22 | 65 years and over | 2 |

b. The number of years of earnings

See Section III B.2.b. above.

c. Percent of clients not expected to reach retirement age

The same death and disability rates used for rehabilitated wage earners were also used for this select group of not rehabilitated clients. (See Appendix F.)

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39/ Ibid., p. 40.

d. Yearly earnings

The not rehabilitated clients earning wages at acceptance whose cases were closed during fiscal year 1964 after a VR plan had been initiated earned $37.25 a week at acceptance. This was an annual rate of $1,862 which was used for the fiscal year 1966 estimates. (See Appendix R.)

e. Results

The calculations dictated by the formula shown in VI. B.2. above yielded $1.4 million as the amount of discounted lifetime earnings of not rehabilitated clients, based on their earnings at acceptance.

3. Summary

It was estimated that the lifetime earnings of this select group of not rehabilitated wage earners who received VR services will be increased by $7.5 million over the course of their working lives because they received VR services under the Federal-State Program. This was derived by subtracting the amount of lifetime earnings not due to VR ($1.4 million) from the lifetime earnings, based on earnings at closure ($8.8 million). When this increase of $7.5 million was compared to the total cost of $147 million on all persons (not only the not rehabilitated), the contribution to the overall increase in lifetime earnings per dollar of expenditure came to 5¢.

This amount is quite small but it may be possible in the near future to obtain a better estimate of benefits to the not rehabilitated from the new statistical reports which will show, among other things, some specific ways in which a client has been benefited such as physical adaptation, personal adjustment, educational development, economic improvement or increased ability to communicate.

## VII. Cost of VR Services

### A. Introduction

Total cost included the cost of case services and the business enterprise program (BEP), guidance, counseling and administration. Expenditures for research, training, international, and other activities of the Vocational Rehabilitation Administration were excluded from this analysis because they were not directly involved in the giving of services to disabled clients. Also excluded from total cost were capital expenditures for rehabilitation facilities and workshops.

Included in the total were estimates of amounts expended not only by State and Federal governments but also by private and other public agencies and by individuals. The exclusion of these groups would have led to an underestimate of the funds actually expended on clients whose cases were closed in fiscal year 1966 and an overestimate of the effects of State and Federal funds.

Although rehabilitation services may last for several years no discounting of this past cost took place. The year in which an expense was incurred was not known. However, the average length of time to close a rehabilitated case was about a year and for the not rehabilitated, about a year and a half. For this reason, it is believed that the effect of not discounting is minimal.

### B. Case Service Expenditures

These costs are for specific services such as surgical and medical treatment, hospitalization, physical therapy, job training, fitting of prosthetic appliances, etc. The expenditures for these services were reported to VRA, by State VR agencies, on VRA Form R-304, Part 7, (and Form R-310 for not rehabilitated clients in fiscal year 1964).

The reported cost figures represent actual expenditures on closed cases for as long a time period as the cases were active, whether six months, six years, etc. Only for funds expended by non-State or Federal sources were estimates required.

#### 1. Rehabilitated Clients

##### a. Federal-State expenditures

The case service expenditures, when added by type of service, came to $74.2 million. (See Appendix T).

b. Expenditures by other agencies and individuals:

The mean case service cost of rendering services to clients on whom State VR agencies spent money was determined for each type of service. The mean figure was then applied to the number of persons receiving a service without cost to a VR agency, by type of service. The assumption here was that VR agency expenditures on a given type of service would, on the average, be the same amount to be spent by others for the same service.

This assumption can neither be verified nor disproved. State VR expenditures reported to us might understate the cost of a given service because of instances where the agency pays partially for a service and another party pays for the remainder of that service. Our data would show this only as a State-agency-paid service and the "other" party amount would not be known. The effect of this understatement would be reduced if the mean cost of a service paid for fully by State VR agencies exceeded the mean cost for the same service fully paid by a non-VR source. The estimate of the amount of case service expenditures by non-VR sources came to $8.6 million bringing the total expenditure (regardless of source of expenditure) to $82.7 million. (See Appendix T).

2. Not Rehabilitated Clients

a. Federal-State expenditures:

In fiscal year 1964 the total case service expenditures came to $7.3 million.40/

b. Expenditures by other agencies and individuals:

The mean case service cost of rendering services to clients on whom State VR agencies spent money was determined for each type of service. The mean figure was then applied to the number of persons receiving a service without cost to a VR agency, by type of service.

The estimate of the amount of case service expenditures by non-VR sources came to $1.2 million bringing the total expenditures (regardless of source of expenditure) for case services in fiscal year 1964 to $8.5 million. (See Appendix U). An estimate of total case service cost for fiscal year 1966 was obtained by raising the $8.5 million figure by the relative increase in the total number of not rehabilitated cases from fiscal year 1964 to fiscal year 1966. The resulting ratio estimate was $13.4 million. (See Appendix U).

The grand total case service cost for all cases closed in fiscal year 1966 came to $96.1 million.

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40/ Ibid., p. 33.

C. Non-Case Service Expenditures

Expenditures for guidance and counseling services for clients and for administration constitute non-case service costs. These costs are involved in the rendering of services to VR clients. They are not reported to us on a case-by-case basis and estimates had to be made for them.

State agencies do, however, report on these expenditures for all clients, including many still on the active caseload rolls, for a single year. Thus, the expenditures for the basic support program during fiscal year 1966 was $213.7 million of which $68.6 million went for administration, guidance and counseling.

Excluding a sum of $15.1 million from the total for capital expenditures on workshops and rehabilitation facilities left $198.5 million. Dividing this into $68.6 million gave 34.6% as the percentage of the total applicable expenditures devoted to guidance, counseling and administration in fiscal year 1966. Conversely, 65.4% went for case services. (See Appendix V)

It was then assumed that the case service cost of $96.1 million (Section VII. B.2.b. above) spent during the months and years of rehabilitation services to clients whose cases were closed in fiscal year 1966 was also 65.4% of the total actual cost of rendering services to these persons. Dividing the case service figure by 65.4% led to the overall cost estimate of $146.9 million. (See Appendix V)

## VIII. Some Intangible Benefits of Vocational Rehabilitation

In addition to the measurable benefits that accrue from vocational rehabilitation services, there are intangible benefits which are probably of even greater importance and significance than any economic gains. These intangible benefits are qualitative and do not readily lend themselves to quantification. They are varied in nature and scope and no listing of them can be exhaustive.

For the purpose of this section, these intangible benefits have been divided into three groups--benefits to the rehabilitated clients; benefits to his family and friends; and benefits to the community in which he resides.

1. Benefits to the rehabilitated client --

   a. Improved vitality and better health

   b. A heightened sense of independence --

   Through the mastery of self-care techniques, many clients learn to care for their personal needs with less assistance from others. New or increased earnings reduce a client's financial reliance on public assistance, family, or friends. This leads to a sense of accomplishment and freedom and helps to dispel feelings of dependence, uselessness, and hopelessness, which often torment the disabled. The newly self-supporting individual thus attains greater stature in his own esteem as well as in the eyes of others.

   c. Improved personal ties --

   Vocational rehabilitation services and eventual employment enable the disabled person to partake more fully in everyday affairs. He is more likely to participate in activities outside the home. He has had the benefit of services that can improve his ability and desire to engage in community activities and form new and rewarding relationships, or to renew the old.

   d. Job satisfaction --

   An integral part of the rehabilitation process is the emphasis placed on the suitability of the client for a job, and a job for the client. Skilled vocational rehabilitation counselors and other professional personnel assess the client's physical and mental capabilities, personal preferences, aptitudes, past work experience, etc., so that the client can be placed in a job in which he is likely to perform well and to find personal satisfaction. With proper placement he is no longer harrassed by working in a job which overtaxes his

strength or is unhealthy or unsafe for him. He is able to perform his duties at an improved level of efficiency, less concerned now about the sufferance of a kindly employer, or imminent dismissal by a harsher one. Performing well in a job to which he is well suited gives the client a feeling of pride and achievement.

Those clients who receive job training have the further advantage of learning the latest in methods and techniques. This training can give the individual important future opportunities or "options" which would otherwise be lacking.

2. Benefits to family and friends --

a. Higher standard of living --

The life of the rehabilitated client is naturally enmeshed with the lives of many other persons--his family and his friends. Obviously, a successful rehabilitation leads to a better life for the dependents of the disabled and often reduces or eliminates the financial and other burdens borne by family and friends. These persons can now use more of their own resources for their own needs and are less likely to risk financial hardship.

b. Strengthening of family ties --

Conceivably, family ties weakened by the frustrations and tensions attendant to disability, can be made strong again. Thus, family dissolution so devastating to all members of the family unit, is not as likely. Children continue to reside in the home with both parents--a most important factor in the prevention of juvenile delinquency. In the case of a rehabilitated father, he can once more take his place as the breadwinner and head of the household.

c. Improved care of children --

Vocational rehabilitation of persons with children may significantly improve future generations. The children of the rehabilitated can be more adequately cared for and supervised, their level of health, behavior, and school performance is likely to rise, thereby reducing the probability of school dropout, delinquency, and crime.

When a rehabilitated parent is removed from public assistance rolls, the entire vicious cycle of public dependency may be broken by the example set by a father or mother who supports the family through the practice of industry, ambition and self-help. It is not likely that children with such an example will become public assistance recipients in later life.

d. Lessened concern about the disabled youngster --

Parents of young adults who are disabled live in a state of constant

concern over the future of their offspring. Some of this worry can be dispelled after rehabilitation services are rendered. Some degree of peace and solace may come with the knowledge that the young person can become self-supporting and relatively independent.

3. Benefits to the community --

Through rehabilitation services, the disabled person is transformed from an object of pity to a symbol of hope to other disabled persons in the community. Strong feelings of sympathy and a deep understanding of the problems of the disabled often lead the rehabilitated person to contribute to community activities designed to help persons who are disabled, poor, or disadvantaged. In this manner the morale of the entire community is raised. Through the rehabilitation of individuals into productive employment, special skills not previously found in the community may now be available. Also, labor shortages in particular occupations are often reduced by the disabled. Their well known devotion to their jobs and low accident rates are a further benefit to any community.

The intangible benefits outlined above are by no means complete. As previously stated, these benefits are too numerous to cover entirely, but, solely from the items discussed, it is evident that vocational rehabilitation does contribute significantly to the uplift of the client, his family, and the community.

Appendix A

Number and percent distribution of persons rehabilitated, by age at acceptance; and derivation of the age distribution of wage earners, homemakers and unpaid family workers, and self-employed farmers - fiscal year 1966.

| Age group (years) | All rehabilitations | Percent distribution | Wage earners at closure (includes self-employed) | Homemakers and unpaid family workers | Farmers (self-employed) | Wage earners at acceptance |
|---|---|---|---|---|---|---|
| Total | 154,081[1/2/] | 100.0 | 127,824[3/] | 24,127[4/] | 2,328[3/] | 28,379[3/] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Under 20 | 35,295 | 22.9 | 29,281 | 5,526 | 533 | 6,499 |
| 20-34 | 47,645 | 30.9 | 39,531 | 7,456 | 719 | 8,769 |
| 35-44 | 29,657 | 19.3 | 24,590 | 4,656 | 449 | 5,477 |
| 45-54 | 24,845 | 16.1 | 20,618 | 3,884 | 375 | 4,569 |
| 55-64 | 13,938 | 9.0 | 11,575 | 2,171 | 210 | 2,554 |
| 65 & over | 2,701 | 1.8 | 2,229 | 434 | 42 | 511 |

1/ Number reporting age at acceptance.

2/ Vocational Rehabilitation Administration, Characteristics and Trends of Clients Rehabilitated in Fiscal Years 1962 - 1966, p. 10.

3/ Unpublished VRA data.

4/ Characteristics and Trends, op. cit., p. 20.

Note: The percents shown in column (3) were multiplied by the number of clients shown on the total line of columns (4) through (7) to obtain the number of clients, by age, in each column.

Appendix B

Number of years for which increased earnings were calculated, from closure and from acceptance, by age at acceptance - for cases closed in fiscal year 1966.

| Age group (years) | Median age (years) | Average length of time to rehabilitate (years) | Retirement age (years) | Years of expected earnings from closure[1/] | Years of expected earnings from acceptance[2/] |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Under 20 | 18 | 1 | 62 | 43 | 44 |
| 20-34 | 27[3/] | 1 | 62 | 34 | 35 |
| 35-44 | 40 | 1 | 62 | 21 | 22 |
| 45-54 | 50 | 1 | 62 | 11 | 12 |
| 55-64 | 60 | 1 | 65 | 4 | 5 |
| 65 & over | 67 | 1 | 70 | 2 | 3 |

1/ Column (4) less columns (2) and (3). Assumes VR services were rendered.

2/ Column (4) less column (2). Assumes VR services were not rendered.

3/ Strictly speaking, the median is 27½ years but 27 was used for arithmetic simplicity.

Note: Not all clients are expected to work for the number of years shown in columns (5) and (6). A great many will die or become disabled again before they can reach the age at which they would have retired.

Appendix C

Percent of workers insured under Social Security awarded benefits because of disability, by age - 1964.

| Age group (years) | Number of benefits awarded[1] | Number of living workers insured for disability--1/1/64[2] | Percent awarded benefits[3] |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| Under 25 | 458 | 2.79 million | 0.02 |
| 25-34 | 9,261 | 13.12 " | 0.07 |
| 35-44 | 24,397 | 14.57 " | 0.17 |
| 45-54 | 59,029 | 13.49 " | 0.44 |
| 55-64 | 112,888 | 8.91 " | 1.27 |

1/ Social Security Administration, Annual Supplement to the Social Security Bulletin - 1964, p. 35.

2/ Ibid., p. 35.

3/ Column (2) ÷ Column (3).

Appendix D

Estimates of proportion of persons[1/] having chronic conditions who are in the labor force, by age.

| Age group (years) | Number of persons with one or more chronic conditions: In labor force[2/] | Not in labor force[2/] | Total[3/] | Percent in labor force[4/] |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 17-39 | 13,566,000 | 1,864,000 | 15,430,000 | 87.9 |
| 40-59 | 15,787,000 | 1,092,000 | 16,879,000 | 93.5 |
| 60 & over | 4,714,000 | 6,170,000 | 10,885,000 | 43.3 |

1/ Includes persons with a major activity in the last year of work, retirement and "other".

2/ Unpublished data from the National Health Survey for the period July, 1959 to June, 1961.

3/ Column (2) plus column (3).

4/ Column (2) ÷ column (4).

Appendix E

Estimate of yearly rates of drop-out from employment due to new or recurrent disability after rehabilitation assumed applicable to rehabilitated wage earners, by age.

| Age group (years) | Number of persons with one or more chronic conditions[1] | In labor force | | Limited in last year when working[4] | Percent becoming limited in last year[5] |
|---|---|---|---|---|---|
| | | Percent[2] | Number[3] | | |
| (1) | (2) | (3) | (4) | (5) | (6) |
| 17-44 | 18,295,000 | 87.9 | 16,081,000 | 378,000 | 2.4 |
| 45-64 | 18,162,000 | 93.5 | 16,981,000 | 504,000 | 3.0 |
| 65 & over | 6,841,000 | 43.3 | 2,962,000 | 185,000 | 6.2 |

1/ U.S. National Health Survey, Duration of Limitation of Activity, Health Statistics, Series B-31, p. 18. Major activities of work, retirement and "other" are included.

2/ From Appendix D. Note that the age groupings shown in Appendix D are not in line with those in column (1) of this appendix.

3/ Column (2) x column (3).

4/ National Health Survey, B-31, p. 26.

5/ Column (5) ÷ column (4).

Note: It was assumed that once a limitation occurred that this meant permanent withdrawal from employment.

Appendix F: Computation of rates of drop-out from employment due to death and disability among rehabilitated wage earners, with and without VR services, by age

| Age (years) | General population death rates[1] | Assumed factor of increase in death rates due to disability[2] | Estimated death rates--disabled population[3] | Disability drop-out rates | | Total drop-out rates | |
|---|---|---|---|---|---|---|---|
| | | | | With VR [4] | Without VR [5] | With VR [6] | Without VR [7] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 18 | 0.1% | 2.01 | 0.2% | 2.4% | 9.4% | 2.6% | 9.6% |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | 0.1% | 2.01 | 0.2% | | | 2.6% | 9.6% |
| 30 | 0.2% | 1.77 | 0.4% | | | 2.8% | 9.8% |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | 0.2% | | 0.4% | | | 2.8% | 9.8% |
| 38 | 0.3% | | 0.5% | | | 2.9% | 9.9% |
| 39 | | 1.77 | | | | | |
| 40 | | 1.58 | | | | | |
| 41 | 0.3% | | 0.5% | | | 2.9% | 9.9% |
| 42 | 0.4% | | 0.6% | | | 3.0% | 10.0% |
| 43 | | | | | | | |
| 44 | 0.4% | | 0.6% | 2.4% | 9.4% | 3.0% | 10.0% |
| 45 | 0.5% | | 0.8% | 3.0% | 8.4% | 3.8% | 9.2% |
| 46 | 0.5% | | 0.8% | | | 3.8% | 9.2% |
| 47 | 0.6% | 1.58 | 0.9% | 3.0% | 8.4% | 3.9% | 9.3% |

Continued

Appendix F: Continued

| Age (years) | General population death rates[1] | Assumed factor of increase in death rates due to disability[2] | Estimated death rates--disabled population[3] | Disability drop-out rates | | Total drop-out rates | |
|---|---|---|---|---|---|---|---|
| | | | | With VR [4] | Without VR [5] | With VR [6] | Without VR [7] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 48 | 0.6% | 1.58 | .9% | 3.0% | 8.4% | 3.9% | 9.3% |
| 49 | 0.7% | 1.58 | 1.1% | | | 4.1% | 9.5% |
| 50 | 0.8% | 1.28 | 1.0% | | | 4.0% | 9.4% |
| 51 | 0.8% | | 1.0% | | | 4.0% | 9.4% |
| 52 | 0.9% | | 1.2% | | | 4.2% | 9.6% |
| 53 | 1.0% | | 1.3% | | | 4.3% | 9.7% |
| 54 | 1.1% | | 1.4% | | | 4.4% | 9.8% |
| 55 | 1.2% | | 1.5% | | | 4.5% | 9.9% |
| 56 | 1.3% | | 1.7% | | | 4.7% | 10.1% |
| 57 | 1.4% | | 1.8% | | | 4.8% | 10.2% |
| 58 | 1.5% | | 1.9% | | | 4.9% | 10.3% |
| 59 | 1.6% | | 2.0% | | | 5.0% | 10.4% |
| 60 | 1.7% | | 2.2% | | | 5.2% | 10.6% |
| 61 | 1.9% | | 2.4% | | | 5.4% | 10.8% |
| 62 | 2.0% | | 2.6% | | | 5.6% | 11.0% |
| 63 | 2.2% | | 2.8% | | | 5.8% | 11.2% |
| 64 | 2.4% | | 3.1% | 3.0% | 8.4% | 6.1% | 11.5% |
| 65 | 2.6% | | 3.3% | 6.2% | 9.9% | 9.5% | 13.2% |
| 66 | 2.9% | | 3.7% | | | 9.9% | 13.6% |
| 67 | 3.1% | | 4.0% | | | 10.2% | 13.9% |
| 68 | 3.4% | | 4.4% | | | 10.6% | 14.3% |
| 69 | 3.6% | 1.28 | 4.6% | 6.2% | 9.9% | 10.8% | 14.5% |

1/ U.S. Bureau of the Census, Statistical Abstract of the United States: 1966. p. 53. Rates are for 1964.

2/ Society of Actuaries, Impairment Study - 1951. Figures are "Mortality ratios". See text for explanation.

3/ Column (2) x column (3). 4/ From Appendix E. 5/ From Appendix H. 6/ Column (4) + column (5).

7/ Column (4) + column (6).

Note: The above rates were used also for the select group of not rehabilitated wage earners.

Appendix G

Computations of mean yearly earnings of rehabilitated wage earners, based on their earnings at closure and at acceptance - FY 1966.

| | | At closure | | At acceptance | |
|---|---|---|---|---|---|
| Weekly earnings | Median earnings | Number of persons[1/] | Aggregate earnings ($000's) | Number of persons[1/] | Aggregate earnings ($000's) |
| (1) | (2) | (3) | (4) | (5) | (6) |
| 1. Zero | Zero | 26,453 | Zero | 125,900 | Zero |
| 2. Less than $10 | $ 5.00 | 1,347 | 7 | 1,428 | 7 |
| 3. $10-19 | $14.50 | 7,144 | 104 | 3,893 | 56 |
| 4. $20-39 | $29.50 | 23,782 | 702 | 8,223 | 243 |
| 5. $40-59 | $49.50 | 38,061 | 1,884 | 7,036 | 348 |
| 6. $60-79 | $69.50 | 29,500 | 2,050 | 3,909 | 272 |
| 7. $80 and over | $90.00 | 27,600 | 2,484 | 3,431 | 309 |
| 8. Amount not reported | -- | 392 | -- | 459 | -- |

a. Number reporting earnings at closure (sum of lines 2-7, column (3)) = 127,434.
b. Aggregate weekly earnings at closure (sum of lines 2-7, column (4)) = $7,230 (000).
c. Mean weekly earnings at closure (line b ÷ line a) = $56.74.
d. Mean yearly earnings (line c x 50) = $2,837. This is the mean earnings for those with earnings.
e. Number reporting earnings at acceptance (sum of lines 2-7, column (5)) = 27,920.
f. Aggregate weekly earnings at acceptance (sum of lines 2-7, column (6)) = $1,235 (000).
g. Mean weekly earnings at acceptance (line f ÷ line e) = $44.23.
h. Mean yearly earnings (line g x 50) = $2,211. This is the mean earnings for those with earnings.

1/ Source: Vocational Rehabilitation Administration, Characteristics and Trends of Clients Rehabilitated in fiscal year 1962-1966, p. 19.

Appendix H

Estimate of yearly rates of drop-out from employment due to disability assumed applicable to rehabilitated wage earners if they did not receive VR services, by age.

| Age group (years) | Number of persons who became limited in major activity last year[1/] | Same as column (2) except major activity was work[1/] | Percent of newly limited with major activity of work[2/] | Number working when limitation in major activity began-major activity was work[1/] |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 17-44 | 393,000 | 306,000 | 77.9 | 1,080,000 |
| 45-64 | 548,000 | 371,000 | 67.7 | 1,673,000 |
| 65 & over | 193,000 | 93,000 | 48.2 | 436,000 |

| Age group (years) | Number who became totally limited last year, while working [3/] | Same as column (6) except major activity was work[4/] | Percent of limited workers who became totally limited last year[5/] |
|---|---|---|---|
| (1) | (6) | (7) | (8) |
| 17-44 | 130,000 | 101,000 | 9.4 |
| 45-64 | 209,000 | 141,000 | 8.4 |
| 65 and over | 99,000 | 43,000 | 9.9 |

1/ National Health Survey, B-31, p. 26.

2/ Column (3) ÷ column (2).

3/ National Health Survey, B-31, p. 15.

4/ Column (4) x column (6).

5/ Column (7) ÷ column (5).

Note: The percents derived in column (8) were used in Appendix F.

Appendix I

Estimate of percent of limited persons with major activity of work who became limited when not at work, by age.

| Age group (years) | Number of limited persons with major activity of work whether or not at work when limitation began[1/] | Number of limited persons with major activity of work not at work when limitation began[1/] | Percent of all limited persons with major activity of work not at work when limitation began[3/] |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 17-44 | 1,319,000 | 239,000 | 18.1 |
| 45-64 | 1,812,000 | 139,000 | 7.7 |
| 65 and over | 479,000 | 43,000[2/] | 9.0 |
| Total | 3,610,000 | 421,000 | 11.7 |

1/ Source: National Health Survey, B-3[illegible], p. 26.

2/ Not shown in NHS publication because of large sampling error.

3/ Column (3) ÷ column (2).

Note: The percents in column (4) were assumed applicable to rehabilitated wage earners who would have found jobs had they not been rehabilitated and who had no earnings at acceptance.

Appendix J

Estimate of yearly rates of termination of work activity due to disability after rehabilitation assumed applicable to rehabilitated homemakers and unpaid family workers, by age.

| Age group (years) | Number of females with one or more chronic conditions-major activity of keeping house | Number of housekeeping females who became limited last year[2/] | Percent of housekeeping females who became limited last year [3/] |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 17-44 | 9,524,000 | 213,000 | 2.2 |
| 45-64 | 7,259,000 | 212,000 | 2.9 |
| 65 and over | 4,911,000 | 223,000 | 4.5 |

1/ National Health Survey, B-31, p. 18.

2/ Ibid., p. 24.

3/ Column (3) ÷ column (2).

Appendix K: Computation of rates of drop-out from employment due to death and disability among rehabilitated homemakers and unpaid family workers, with and without VR services, by age

| Age (years) | White female death rates[1] | Assumed factor of increase in death rates due to disability[2] | Estimated death rates--disabled population[3] | Disability drop-out rates | | Total drop-out rates | |
|---|---|---|---|---|---|---|---|
| | | | | With VR [4] | Without VR [5] | With VR [6] | Without VR [7] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 18 | 0.1% | 2.01 | 0.2% | 2.2% | 8.6% | 2.4% | 8.8% |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | 2.01 | | | | | |
| 30 | | 1.77 | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | 0.1% | | 0.2% | | | 2.4% | 8.8% |
| 37 | 0.2% | | 0.4% | | | 2.6% | 9.0% |
| 38 | | | | | | | |
| 39 | | 1.77 | 0.4% | | | 2.6% | 9.0% |
| 40 | | 1.58 | 0.3% | | | 2.5% | 8.9% |
| 41 | | | | | | | |
| 42 | 0.2% | | 0.3% | | | 2.5% | 8.9% |
| 43 | 0.3% | | 0.5% | | | 2.7% | 9.1% |
| 44 | | | | 2.2% | 8.6% | 2.7% | 9.1% |
| 45 | | | | 2.9% | 8.1% | 3.4% | 8.6% |
| 46 | 0.3% | | 0.5% | | | 3.4% | 8.6% |
| 47 | 0.4% | 1.58 | 0.6% | 2.9% | 8.1% | 3.5% | 8.7% |

Continued

Appendix K: Continued

| Age (years) | White female death rates[1] | Assumed factor of increase in death rates due to disability[2] | Estimated death rates--disabled population[3] | Disability drop-out rates | | Total drop-out rates | |
|---|---|---|---|---|---|---|---|
| | | | | With VR [4] | Without VR [5] | With VR [6] | Without VR [7] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 48 | 0.4% | 1.58 | 0.6% | 2.9% | 8.1% | 3.5% | 8.7% |
| 49 | 0.4% | 1.58 | | | | | |
| 50 | 0.5% | 1.28 | | | | | |
| 51 | 0.5% | | 0.6% | | | 3.5% | 8.7% |
| 52 | 0.6% | | 0.8% | | | 3.7% | 8.9% |
| 53 | 0.6% | | 0.8% | | | 3.7% | 8.9% |
| 54 | 0.7% | | 0.9% | | | 3.8% | 9.0% |
| 55 | 0.7% | | 0.9% | | | 3.8% | 9.0% |
| 56 | 0.8% | | 1.0% | | | 3.9% | 9.1% |
| 57 | 0.8% | | 1.0% | | | 3.9% | 9.1% |
| 58 | 0.9% | | 1.2% | | | 4.1% | 9.3% |
| 59 | 1.0% | | 1.3% | | | 4.2% | 9.4% |
| 60 | 1.0% | | 1.3% | | | 4.2% | 9.4% |
| 61 | 1.1% | | 1.4% | | | 4.3% | 9.5% |
| 62 | 1.2% | | 1.5% | | | 4.4% | 9.6% |
| 63 | 1.4% | | 1.8% | | | 4.7% | 9.9% |
| 64 | 1.5% | | 1.9% | 2.9% | 8.1% | 4.8% | 10.0% |
| 65 | 1.7% | | 2.2% | 4.5% | 7.2% | 6.7% | 9.4% |
| 66 | 1.9% | | 2.4% | | | 6.9% | 9.6% |
| 67 | 2.1% | | 2.7% | | | 7.2% | 9.9% |
| 68 | 2.3% | | 2.9% | | | 7.4% | 10.1% |
| 69 | 2.5% | 1.28 | 3.2% | 4.5% | 7.2% | 7.7% | 10.4% |

1/ U.S. Bureau of the Census, Statistical Abstract of the United States: 1966. p. 53. Rates are for 1964.

2/ Society of Actuaries, Impairment Study - 1951. Figures are "Mortality ratios". See text for explanation.

3/ Column (2) x column (3).

4/ From Appendix J.

5/ From Appendix M.

6/ Column (4) + column (5). 7/ Column (4) + column (6).

## Appendix L: Estimate of value of work activity at closure of homemakers and unpaid family workers

1. Mean annual earnings of full-time workers, working 40-52 weeks in 1964, who were related to the heads of their households, by sex, by occupation[1/].

| Occupation | Males | Females |
|---|---|---|
| Clerical and sales | $4501 | $3631 |
| Service | $3680 | $2342 |
| Farmers and farm laborers | $1489 | -- |
| Private household workers | -- | $1165 |
| Mean (not weighted by occupation) | $3223 | $2379 |

Mean (weighted by sex) = $3223 (.597[2/]) + $2379 (.403[3/]) = $2883. This is the value used for the mean annual value of work activity for unpaid family workers at closure.

2. Mean annual earnings of full-time female private household workers, not living with relatives, working 40-52 weeks in 1964 = $1832 [1/].

3. $1832 (.85[4/]) + 2883 (.15[5/]) = $1990. This is the value used for the mean annual value of work activity among homemakers and unpaid family workers at closure.

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1/ Unpublished data from the Bureau of the Census.

2/ Proportion of all rehabilitated persons who were males--FY 1966.

3/ Proportion of all rehabilitated persons who were females--FY 1966.

4/ Proportion of homemakers and unpaid family workers who were estimated to be homemakers.

5/ Proportion of homemakers and unpaid family workers who were estimated to be unpaid family workers.

Appendix M: Derivation of yearly rates of termination of work activity due to disability assumed applicable to rehabilitated homemakers and unpaid family workers if they had not received VR services, by age

| Age group (years) | Yearly percent of work activity termination | | | |
|---|---|---|---|---|
| | Wage earners | | Homemakers, etc. | |
| | With VR 1/ | Assuming no VR 2/ | With VR 3/ | Assuming no VR 4/ |
| (1) | (2) | (3) | (4) | (5) |
| 17-44 | 2.4 | 9.4 | 2.2 | 8.6 |
| 45-64 | 3.0 | 8.4 | 2.9 | 8.1 |
| 65 and over | 6.2 | 9.9 | 4.5 | 7.2 |

1/ From Appendix E.

2/ From Appendix H.

3/ From Appendix J.

4/ Column (3) ÷ column (2); quotient then multiplied by column (4).

Note: The procedure estimating the percents in column (5) assumed that the relationships in drop-out rates between rehabilitated wage-earners with and without VR was the same as for rehabilitated homemakers and unpaid family workers with and without VR.

Appendix N: Estimate of percent of males having chronic conditions who are in the labor force, by age

| Age group (years) | Number of males with one or more chronic conditions | | | Percent in labor force 3/ |
|---|---|---|---|---|
| | In labor force 1/ | Not in labor force 1/ | Total 2/ | |
| (1) | (2) | (3) | (4) | (5) |
| 17-39 | 9,661,000 | 872,000 | 10,533,000 | 91.7 |
| 40-59 | 11,024,000 | 754,000 | 11,777,000 | 93.6 |
| 60 and over | 3,562,000 | 4,658,000 | 8,220,000 | 43.3 |

1/ Unpublished data from the National Health Survey for the period July, 1959 to June, 1961.

2/ Column (2) + column (3).

3/ Column (2) ÷ column (4).

Appendix O: Estimate of yearly rates of employment termination due to disability assumed applicable to rehabilitated self-employed farmers, by age

| Age group (years) (1) | Males with one or more chronic conditions[1] (2) | In labor force | | Number of males working at time limitation of major activity began last yr.[4] (5) | Percent of males in labor force who became limited last year[5] (6) |
|---|---|---|---|---|---|
| | | Percent[2] (3) | Number[3] (4) | | |
| 17-44 | 12,524,000 | 91.7 | 11,485,000 | 266,000 | 2.3 |
| 45-64 | 10,229,000 | 93.5 | 9,564,000 | 387,000 | 4.0 |
| 65 and over | 5,230,000 | 43.3 | 2,265,000 | 168,000 | 7.4 |

1/ National Health Survey, B-31, p. 10.

2/ From Appendix N. Note that the age groupings of these percents in Appendix N are not in line with those in column (1) of this appendix.

3/ Column (2) x column (3).

4/ National Health Survey, B-31, p. 13.

5/ Column (5) ÷ column (4).

Appendix P: Computation of rates of drop-out from employment due to death and disability among rehabilitated self-employed farmers, with and without VR services, by age

| Age (years) | White male death rates 1/ | Assumed factor of increase in death rates due to disability 2/ | Estimated death rates--disabled population 3/ | Disability drop-out rates | | Total drop-out rates | |
|---|---|---|---|---|---|---|---|
| | | | | With VR 4/ | Without VR 5/ | With VR 6/ | Without VR 7/ |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 18 | 0.1% | 2.01 | 0.2% | 2.3% | 9.0% | 2.5% | 9.2% |
| 19 | 0.2% | | 0.4% | | | 2.7% | 9.4% |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | 2.01 | | | | | |
| 30 | | 1.77 | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | 0.2% | | 0.4% | | | 2.7% | 9.4% |
| 37 | 0.3% | | 0.5% | | | 2.8% | 9.5% |
| 38 | | | | | | | |
| 39 | | 1.77 | | | | | |
| 40 | 0.3% | 1.58 | 0.5% | | | 2.8% | 9.5% |
| 41 | 0.4% | | 0.6% | | | 2.9% | 9.6% |
| 42 | 0.4% | | 0.6% | | | 2.9% | 9.6% |
| 43 | 0.5% | | 0.8% | | | 3.1% | 9.8% |
| 44 | 0.5% | | 0.8% | 2.3% | 9.0% | 3.1% | 9.8% |
| 45 | 0.6% | | 0.9% | 4.0% | 11.2% | 4.9% | 12.1% |
| 46 | 0.6% | | 0.9% | | | 4.9% | 12.1% |
| 47 | 0.7% | 1.58 | 1.1% | 4.0% | 11.2% | 5.1% | 12.3% |

Continued

Appendix P: Continued

| Age (years) | White male death rates 1/ | Assumed factor of increase in death rates due to disability 2/ | Estimated death rates--disabled population 3/ | Disability drop-out rates: With VR 4/ | Disability drop-out rates: Without VR 5/ | Total drop-out rates: With VR 6/ | Total drop-out rates: Without VR 7/ |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 48 | .8% | 1.58 | 1.3% | 4.0% | 11.2% | 5.3% | 12.5% |
| 49 | .8% | 1.58 | 1.3% | | | 5.3% | 12.5% |
| 50 | .9% | 1.28 | 1.2% | | | 5.2% | 12.4% |
| 51 | 1.0% | | 1.3% | | | 5.3% | 12.5% |
| 52 | 1.1% | | 1.4% | | | 5.4% | 12.6% |
| 53 | 1.2% | | 1.5% | | | 5.5% | 12.7% |
| 54 | 1.4% | | 1.8% | | | 5.8% | 13.0% |
| 55 | 1.5% | | 1.9% | | | 5.9% | 13.1% |
| 56 | 1.6% | | 2.0% | | | 6.0% | 13.2% |
| 57 | 1.8% | | 2.3% | | | 6.3% | 13.5% |
| 58 | 1.9% | | 2.4% | | | 6.4% | 13.6% |
| 59 | 2.1% | | 2.7% | | | 6.7% | 13.9% |
| 60 | 2.3% | | 2.9% | | | 6.9% | 14.1% |
| 61 | 2.4% | | 3.1% | | | 7.1% | 14.3% |
| 62 | 2.6% | | 3.3% | | | 7.3% | 14.5% |
| 63 | 2.9% | | 3.7% | | | 7.7% | 14.9% |
| 64 | 3.1% | | 4.0% | 4.0% | 11.2% | 8.0% | 15.2% |
| 65 | 3.4% | | 4.4% | 7.4% | 11.8% | 11.8% | 16.2% |
| 66 | 3.7% | | 4.7% | | | 12.1% | 16.5% |
| 67 | 4.0% | | 5.1% | | | 12.5% | 16.9% |
| 68 | 4.4% | | 5.6% | | | 13.0% | 17.4% |
| 69 | 4.7% | 1.28 | 6.0% | 7.4% | 11.8% | 13.4% | 17.8% |

1/ U.S. Bureau of the Census, Statistical Abstract of the United States: 1966. p. 53. Rates are for 1964.

2/ Society of Actuaries, Impairment Study - 1951. Figures are "Mortality ratios". See text for explanation.

3/ Column (2) x column (3).

4/ From Appendix O.

5/ From Appendix Q.

6/ Column (4) + column (5).

7/ Column (4) + column (6).

Appendix Q: Derivation of yearly rates of termination of work activity due to disability assumed applicable to rehabilitated self-employed farmers if they had not received VR services, by age

| Age group (years) | Yearly percent of work activity termination | | | |
|---|---|---|---|---|
| | Wage earners | | Self-employed farmers | |
| | With VR 1/ | Assuming no VR 2/ | With VR 3/ | Assuming no VR 4/ |
| (1) | (2) | (3) | (4) | (5) |
| 17-44 | 2.4 | 9.4 | 2.3 | 9.0 |
| 45-64 | 3.0 | 8.4 | 4.0 | 11.2 |
| 65 and over | 6.2 | 9.9 | 7.4 | 11.8 |

1/ From Appendix E.

2/ From Appendix H.

3/ From Appendix O.

4/ Column (3) ÷ column (2); quotient then multiplied by column (4).

Note: The procedure estimating the percents in column (5) assumed that the relationships in drop-out rates between rehabilitated wage earners with and without VR was the same as for rehabilitated self-employed farmers with and without VR.

Appendix $R_1$: Estimate of the number of not rehabilitated wage earners, at closure and at acceptance--Fiscal Year 1966

a. Number of not rehabilitated cases on which detailed information was received for special one-time study (FY 1964) = 31,156 1/

b. Number of these cases closed after plan initiation (FY 1964) = 14,553

c. Percent of all cases that were closed after plan initiation (FY 1964) (line b ÷ line a) = 46.7%.

d. Number of not rehabilitated closures in FY 1966 = 48,969 2/

e. Estimated number of FY 1966 cases that were closed after plan initiation (line c x line d) = 22,869

f. Number of cases from line b known to have had a specified amount of earnings at closure other than zero (FY 1964) = 173 3/

g. Estimated number of FY 1966 cases who would be known to have had a specified amount of earnings at closure if a study comparable to the one in FY 1964 were conducted (line e ÷ line b; quotient multiplied by line f) = 272

h. Number of line b cases known to be employed at closure and at acceptance (FY 1964) = 116

i. Number of line b cases known to be employed at closure but not at acceptance (FY 1964) = 314 4/

j. Percent of persons employed at closure also employed at acceptance (FY 1964) (line h ÷ line i) = 36.9%

k. Estimated number of line g cases (FY 1966) also employed at acceptance (line g x line j) = 100

---

1/ The grand total of not rehabilitated cases for FY 1964 was 35,193.
2/ Source: The VRA report, Caseload Statistics--State VR Agencies--FY 1966.
3/ Closed for reasons other than death.
4/ This is greater than number with earnings (line f) because it includes some persons without earnings and others whose amount of earnings were not known.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Note: The source for all FY 1964 data was The VRA report, The Not Rehabilitated Clients.

Appendix $R_2$: Distribution of estimated number of not rehabilitated clients with earnings at acceptance and closure, by age groupings

| Age group (years) | Number of cases closed after plan initiation FY 1964 | Percent distribution | Estimate of number with earnings in FY 1966 | |
|---|---|---|---|---|
| | | | at closure 4/ | at acceptance 5/ |
| (1) | (2) | (3) | (4) | (5) |
| Under 20 | 2,095 | 14.4 | 39 | 14 |
| 20-34 | 4,193 | 28.8 | 79 | 29 |
| 35-44 | 3,214 | 22.1 | 60 | 22 |
| 45-54 | 3,111 | 21.4 | 58 | 21 |
| 55-64 | 1,703 | 11.7 | 32 | 12 |
| 65 and over | 237 | 1.6 | 4 | 2 |
| | 14,553 | 100.0 | 272 | 100 |

4/ Column (3) x 272

5/ Column (3) x 100

Appendix S

Computation of mean annual earnings, based on earnings at closure and acceptance of select group of not rehabilitated clients--Fiscal Year 1964

| | | At closure | | At acceptance | |
|---|---|---|---|---|---|
| Weekly earnings | Earnings midpoint | Number with earnings[1] | Aggregate weekly earnings[2] | Number with earnings[1] | Aggregate weekly earnings[3] |
| (1) | (2) | (3) | (4) | (5) | (6) |
| $ 1-9 | $ 5.00 | 8 | $ 40 | 82 | $ 410 |
| $10-19 | $14.50 | 17 | $ 246 | 142 | $ 2,059 |
| $20-39 | $29.50 | 36 | $1,062 | 217 | $ 6,401 |
| $40-59 | $49.50 | 60 | $2,970 | 159 | $ 7,870 |
| $60-79 | $69.50 | 30 | $2,085 | 61 | $ 4,240 |
| $80 and over | $90.00 | 22 | $1,980 | 69 | $ 6,210 |
| Total | | 173 | $8,383 | 730 | $27,190 |

Mean annual earnings, based on earnings at closure

Mean weekly earnings at closure - $8,383 ÷ 173 = $48.46
Mean annual earnings - $48.46 x 50 = $2,423

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Mean annual earnings, based on earnings at acceptance

Mean weekly earnings at acceptance - $27,190 ÷ 730 = $37.25
Mean annual earnings - $37.25 x 50 = $1,862

1/ Excludes cases closed because of death. The data in this column pertain only to cases closed after plan initiation. There may have been many other persons with earnings but the amounts were not known.

2/ Column (2) x column (3)

3/ Column (2) x column (5)

Note: The above FY 1964 annual earnings data were used for the FY 1966 analysis.

Appendix T

Computations of the total cost of case services to rehabilitated cases, by source and type of service--FY 1966 1/.

| Source or type of service | Number of persons receiving services 2/ | Number with cost to VR agency 2/ | Total cost to VR agency 5/ (000) | Mean cost to VR agency 2/ 3/ | Total case service cost to all parties (000) |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Rehabilitation centers | 17,421 | 15,821 | $ 9,131 | $577 | $10,055 |
| Workshops | 6,343 | 5,906 | 2,703 | 458 | 2,903 |
| Other sources: | | | | | |
| Diagnosis | 145,986 | 123,934 | 4,656 | 38 | 5,584 |
| Training | 49,288 | 44,089 | 22,820 | 518 | 25,510 |
| Medical | 48,549 | 43,532 | 7,702 | 177 | 8,590 |
| Maintenance | 33,947 | 21,275 | 11,229 | 359 | 12,188 |
| Prosthetic appliances | 29,561 | 28,461 | 5,174 | 182 | 5,374 |
| Tools, licenses, etc. | 5,985 | 5,564 | 1,741 | 313 | 1,872 |
| Hospitalization | 31,989 | 27,550 | 8,618 | 313 | 10,007 |
| Other | 3,400 | 1,777 | 397 | 223 | 759 |
| Total | -- | -- | $74,171 | $518 | $82,744 |

1/ These case service costs were accumulated over the length of time that clients were receiving services, whether one month or ten years, etc.

2/ Source: The VRA report, Characteristics and Trends of Clients Rehabilitated in Fiscal Years 1962-1966.

3/ Column (4) ÷ column (3).

4/ Column (5) x column (2). This computation provides for an estimate of cost of case services on the part of sources in addition to the State or Federal governments.

5/ Unpublished VRA data.

Appendix U: Computation of the total cost of case services to not rehabilitated cases, by source and type of service - FY 1964 and FY 1966 [1].

| Source or type of service | Number of persons receiving services[2] | Number with cost to VR agency[2] | Total cost to VR agency[2] (000) | Mean cost to VR agency[2][3] | Total case service cost to all parties[4] (000) |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Rehabilitation centers | 3,184 | 2,642 | $1,560 | $591 | $1,882 |
| Workshops | 913 | 794 | 229 | 288 | 263 |
| Other sources: | | | | | |
| Diagnosis | 27,833 | 22,956 | 958 | 42 | 1,169 |
| Training | 3,922 | 3,306 | 1,345 | 213 | 835 |
| Medical | 2,712 | 2,571 | 704 | 177 | 480 |
| Maintenance | 2,463 | 1,917 | 841 | 564 | 1,389 |
| Prosthetic appliances | 5,601 | 5,193 | 454 | 259 | 1,451 |
| Tools, licenses, etc. | 4,523 | 4,216 | 93 | 199 | 900 |
| Hospitalization | 444 | 367 | 1,081 | 254 | 1,128 |
| Other | 378 | 210 | 22 | 107 | 40 |
| Total | -- | -- | $7,288 | $284 | $8,522 |

1/ The case service costs were accumulated over the length of time that clients were receiving services, whether one month or ten years, etc.

2/ Source: The VRA report, The Not Rehabilitated Clients - FY 1964.

3/ Column (4) ÷ column (3).

4/ Column (5) x column (2). This computation provides for an estimate of cost of case services on the part of sources in addition to the State and Federal governments.

Note: The estimate for total case service cost for FY 1966 was obtained by raising the cost in FY 1964, $8,522,(000) in column 6 above, by the percent increase in the number of not rehabilitated cases in FY 1964 (31,156 cases reporting cost) to FY 1966 (48,969). The final result was $13,395,000.

Appendix V: Computation of the total (direct and indirect) cost of giving services to all cases closed during fiscal year 1966

A. Total basic support (Section 2) expenditures during fiscal year 1966[1/]

| | | |
|---|---|---|
| 1. | Administration | $ 10,637,000 |
| 2. | Guidance and counseling | 57,980,000 |
| 3. | Business Enterprise Program (BEP) | 2,218,000 |
| 4. | Case services | 127,676,000 |
| 5. | Workshops | 2,419,000 |
| 6. | Rehabilitation facilities | 12,722,000 |
| | Total | $213,653,000 |

B. Proportion of total non-capital expenditures accounted for by case services and BEP in FY 1966 = (line 3 + line 4) ÷ sum of lines 1 through 4 = $129,894,000 ÷ $198,511,000 = 65.43%.

C. Total case service (direct) cost - rehabilitated clients $82,744,000 (from Appendix T); not rehabilitated clients

| | | |
|---|---|---|
| | $13,395,000 | (from Appendix U) |
| Total | 96,139,000 | |

GRAND TOTAL COST (direct or indirect) = $96,139,000 ÷ .6543 = $146,933,000

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1/ From the VRA report, State VR Agency Program Data FY 1966.

2/ One of the key assumptions in this cost-benefits analysis was that the estimated case service (direct) expenditures on all active cases closed during FY 1966 represented, over a period of time, the same proportion of all direct and indirect non-capital expenditures on these closures as was experienced for expenditures on all VR clients in a single (FY 1966) year.

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